Removal And Disposal of Soils Contaminated With PCBs Along Highway Shoulders In North Carolina

ADMINISTRATIVE ACTION

FINAL

ENVIRONMENTAL IMPACT STATEMENT

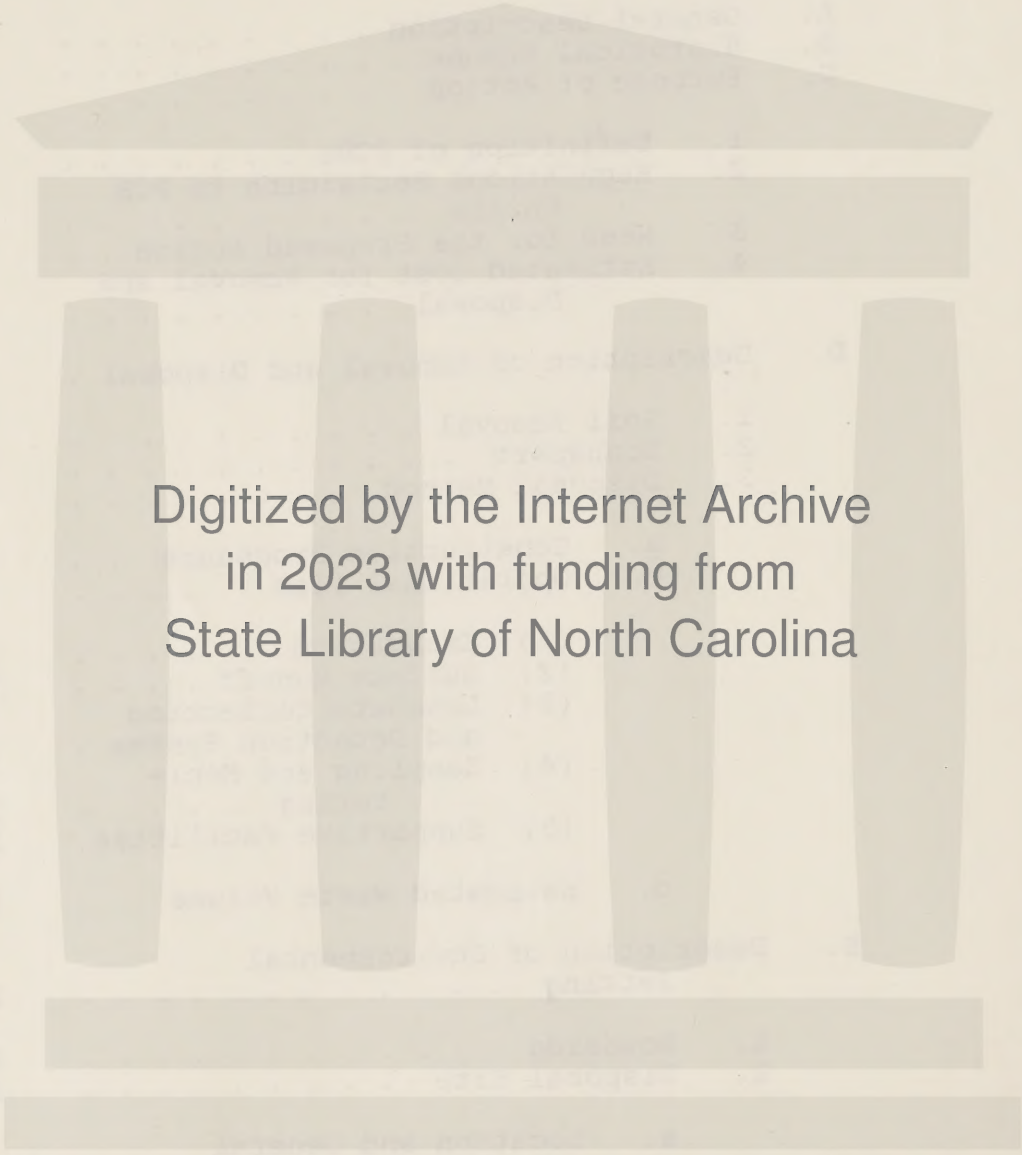
STATE OF NORTH CAROLINA

IN COMPLIANCE WITH
THE NORTH CAROLINA ENVIRONMENTAL POLICY ACT

11/13/80
Date

Burley B. Mitchell, Jr., Secretary
Department of Crime Control
And Public Safety

TABLE OF CONTENTS



SUMMARY

Final Environmental Impact Statement
Prepared by the
North Carolina Department of Crime Control
And Public Safety
In consultation with the
Division of Highways
North Carolina Department of Transportation
Division of Health Services
North Carolina Department of Human Resources
and
Division of Environmental Management
North Carolina Department of Natural Resources
and Community Development

This is an administrative action.

1. Description of Action

The proposed action is the removal and disposal of approximately 40,000 cubic yards of PCB contaminated soil located along approximately 211 shoulder miles of roadway involving 14 central and eastern piedmont counties of the State. The 211 miles of roadway shoulder contaminated with a polychlorinated biphenyl (PCB) substance is the result of deliberate discharges of a liquid PCB industrial waste material from a passing truck. The State of North Carolina proposes to remove and dispose of the PCB contaminated soil in a specially constructed disposal pit that is located on approximately 142 acres of land in Warren County.

2. Summary of Alternatives

Approximately 90 sites located in twenty counties of the State were evaluated as potential disposal sites for the PCB contaminated soil. A set of general guidelines and EPA technical requirements were utilized in the evaluation and selection of disposal sites.

One alternative considered for the proposed action consisted of treatment in-place by applying activated charcoal on the contaminated soil and then blending the activated charcoal material into the soil column of the highway shoulder. Treatment in-place of the PCB contaminated soil is prohibited by EPA regulations. Therefore, this alternative was considered not feasible.

Another alternative considered was transporting the PCB contaminated soil to a PCB material incinerator

located out of State. This alternative was rejected because there is no approved incinerator capable of handling soil contaminated with PCBs. The alternative of transporting the PCB contaminated soil to an existing chemical landfill was considered. This alternative was determined to be not feasible because of limited transportation resources, manpower requirements and excessive cost of disposal estimated at $12 million.

The no action or "Do-Nothing Alternative was not considered a viable alternative because EPA has determined in the course of extensive rulemaking proceedings that PCB contaminated soil in concentrations of 50 parts per million or greater should be disposed of in landfills. It is also sound public policy to be able to make productive use of state highways by allowing driveway access to private property and by placing utility distribution facilities on the highway right-of-way. The roadside cannot be put to these public purposes without disturbing the PCB contaminated soil and causing its further distribution in the environment. For these reasons its removal and safe disposal is in the public interest.

3. Summary of Environmental Impact and Adverse Environmental Effects

The proposed action to remove and dispose of approximately 40,000 cubic yards of PCB contaminated soil will result in some adverse environmental effects. Approximately five acres of agricultural land utilized for the disposal pit will be taken out of production for an indefinite period. No significant environmental effects are anticipated to result from the removal and disposal operations. Test results during trial removal operations show no levels of airborne PCB vapor or dust that exceeded the NIOSH proposed criterion of 1 microgram/m3 or added significant quantities of PCBs to the total atmosphere levels. Dust control measures will be utilized during the removal of the soil to help reduce the PCB laden dust particles.

The disposal pit will be constructed to completely contain the PCB contaminated soil. There will be no hydraulic connection between the PCB contaminated soil and surface water or groundwater. Installations of wells and leachate collection systems will allow monitoring of the disposal site.

The removal of the PCB contaminated soil from the roadsides will have a positive effect on the environment by substantially diminishing the availability of the PCB substance to people as well as plant and non-human animal life. The roadway shoulder and surrounding environment will be restored to normal usage.

Removal And Disposal of Soils Contaminated With PCBs Along Highway Shoulders In North Carolina

FINAL ENVIRONMENTAL IMPACT STATEMENT

I. DESCRIPTION OF PROPOSED ACTION

A. General Description

The State of North Carolina proposes to remove and dispose of approximately 40,000 cubic yards of PCB (polychlorinated biphenyl) contaminated soil. The PCB contaminated soil is the result of deliberate discharges from a passing truck of approximately 30,000-35,000 gallons of liquid waste material on to the roadway shoulders of North Carolina's highways. The discharge of this industrial waste material containing PCBs have been identified along approximately 211 shoulder miles of roadways located in fourteen central and eastern piedmont counties of the State.

The proposed action involves the mechanical removal of the PCB contaminated soil from the roadway shoulders and transporting of the PCB contaminated soil to a disposal site for permanent storage. The disposal site for containment of the PCB contaminated soil will be located, designed and constructed according to Environmental Protection Agency rules and regulations governing the removal and disposal of PCBs (40 CFR 761.41). The site recommended for disposal of the PCB contaminated soil is located in Warren County approximately four miles south of Warrenton.

B. Historical Resume

The first deliberate discharge of what was later identified as PCB liquid materials took place the last week of June, 1978, on remote roads of the Fort Bragg Military Reservation. The discharge was investigated by Fort Bragg personnel who secured liquid samples of the material. The next discharge occurred on July 27 and July 29 on the roadway shoulders of NC 58, north of Centerville in Warren County. This discharge was reported by private citizens to the N. C. Highway Patrol, who alerted the Division of Health Services, Water Supply Branch. Water Supply Branch personnel notified Division of Environmental Management, Water Quality Program personnel in the Raleigh Field Office of the spills. Raleigh Field Office personnel investigated the spill on July 31 as an oil spill and on finding no oil ponded or evidence in surface waters, returned to their office without taking further action.

On August 2, the Water Quality Operations Branch, Division of Environmental management, received a call from a Johnston County farmer concerning a spill on NC 210 in front of his farm. Because of the description of the odor and the effects on field workers being reported, a staff chemist was immediately dispatched to investigate the spill and to take appropriate samples. Grass, soil, and water samples were hand delivered to the Division of Environmental Management Laboratory for analysis later that afternoon, August 2. The same chemist who investigated the Johnston County spill encountered a similar spill near Snow Camp, North Carolina on SR 1004, Alamance County, while returning to his home. A sample was taken from the spill area and hand delivered to the laboratory the following morning for analysis.

On August 4, the Laboratory's Analytical Section Chief notified the Water Quality Operations Branch that the material spilled in Johnston County appeared to be Aroclor-1260, a Polyclorinated Biphenyl (PCB) substance. The Water Quality Operations Branch immediately notified the Chief of the Environmental Protection Agency, Region IV, Emergency Response Branch, of the Laboratory's findings. After briefing the Director, Division of Environmental Management, a meeting was called with representatives of the Attorney General's Office, the Department of Crime Control and Public Safety, and Public Information representatives of the Secretary of the Department of Natural Resources and Community Development. A notification to all law enforcement officials was prepared and sent over the Police Information Network system during the late evening hours of August 4. A news release was prepared and sent to local newspapers for publication in the Saturday morning newspaper. The same day, the laboratory confirmed material discharged in Alamance and Chatham Counties were Aroclor-1260, the same form of PCB material found in Johnston and Harnett Counties. Also on August 4, the N. C. Highway Patrol delivered soil samples obtained from Chatham County to EPA. The results of the EPA laboratory analysis were reported to SBI on August 8.

On August 5, Water Quality Operations Branch met with concerned citizens in Johnston County, investigated the spill areas in Johnston and Harnett Counties, and conducted a door-to-door contact with people residing along NC 210. Because of concern by some residents along NC 210, the Division of Highways, Department of Transportation was requested to cover the spill with a layer of sand in order to suppress the noxious odors present. This was completed in late afternoon August 5 and continued on August 6.

On August 6, the Raleigh Regional Office was directed to secure samples of the spill area in Warren County to determine if similar material had been deposited along NC 58. Because of the publicity being given by the news-paper and TV to the spills, the Fort Bragg Environmental

Coordinator requested the Water Quality Operations Branch to analyze material secured from the spill at Fort Bragg to determine if similar material was spilled on the military reservation. Because of the publicity, reports of spills began coming in from many different sources such as Highway Patrol, Department of Transportation Division Engineers, private citizens, and others in nine additional counties. It appeared that most of the spills took place the evenings of August 1, 2, and 3. While it has not been conclusively determined, spills may have occured in Wilson County the evenings of August 5 and August 8. The Division of Environmental Management Laboratory continued to work around the clock to verify the material in the spills in the other counties.

On August 7, a preliminary conference was held with representatives of the Division of Highways, Division of Health Services, Attorney General's Office, and Public Information personnel. Specific information gathering activities were spelled out and assigned to specific people. A coordination conference was held with representatives of the Department of Human Resources, Department of Agriculture, Attorney General's Office, the Department of Transportation, Environmental Protection Agency, and the news media, on August 10. A working session was held following the briefing to news media to provide direction, identify responsibilities and initiate specific actions concerning the spilled material. Advice was solicited from the Environmental Protection Agency Office of Toxic Substances, the National Center for Disease Control, Hevi Duty Electric Company, the EPA Health Effects Research Laboratory, and various academic and private sector personalities known as having expertise in handling this type of material. On August 11, the EPA Health Effects Research Laboratory began ambient air sampling at spill sites.

North Carolina State University was identified as having expertise in detoxifying pesticides. The University was contacted to provide expert advice and assistance. A proposal was submitted to the Governor for temporarily deactivating the PCB materials to prevent its migration and to neutralize any hazard to people coming into contact with the material on the shoulder of the highway. The Governor provided directive authority to proceed on August 15, 1978. An activated charcoal solution was applied to the PCB contaminated roadway shoulders during the latter part of August. On August 15, the Governor requested assistance from the President of United States. On August 17, a special EPA coordinator was assigned to the problem.

Because the initial sampling procedures only gave gross approximation to the concentration of PCB material on the grass and in the soil column, several cross sectional samples were taken at one-inch intervals to determine the magnitude

of the penetration into the soil column and the strength of the material at various depths. These samples were taken during the period of August 21-28.

On August 28 and 29th, the Epidemiology Section of the North Carolina Division of Health Services convened a meeting of national experts on PCBs. Those in attendance included scientists from the Environmental Protection Agency, National Institute of Occupational Safety and Health, National Institute of Environmental Health Sciences, and the Center for Disease Control. State personnel in attendance were from the Division of Health Services, Natural Resources and Community Development, Department of Agriculture, and the Department of Transportation. Industrial users of PCBs were represented by a person from Carolina Power and Light. The purpose of this meeting was to assess the immediate risks to the persons who live along the spill routes and to discuss the safety of those persons who would be participating in the removal and storage of the PCB contaminated soil.

On September 6, 13, and 19 alternative methods of removing soil from the roadway shoulders were conducted on noncontaminated sections of roadway shoulders. When the soil removal procedure had been formulated a test removal operation was conducted. The test removal operation was performed on October 5, 1978 on a one mile PCB contaminated section of NC 58 near Inez in Warren County. The PCB contaminated soil obtained during the test removal operation has been temporarily stored at a disposal site in Warren County. The purpose of the test was to examine the practicality of picking up the contaminated material as well as any possible health or environmental effects. On November 6, test results indicated that the pick up of contaminated shoulder material was not harmful to the environment or personnel.

On September 29, 1978, Governor James B. Hunt's request for assistance from the Federal District Assistance Administration, Department of Housing and Urban Development was denied. On October 4, North Carolina officials were notified by the Federal Highway Administration, U. S. Department of Transportation, that the request for emergency relief funds was denied.

During the month of December a Draft Negative Declaration was prepared pursuant to the North Carolina Environmental Policy Act. The statement was sent to State Clearinghouse on December 21, 1978 for circulation. Comments received on the Draft Negative Declaration requested an EIS be prepared. Therefore, a Final Negative Declaration was not prepared.

On December 12, an application was filed with EPA for approval of the Warren County site for placement of contaminated PCB material. On January 4, 1979 a hearing was held on the Warren County site at the National Guard Armory.

During the period January 25-31, 1979 additional soil samples were taken by the Division of Environmental Management to substantiate the location of the contaminated material and determine if any migration has occurred. Test results indicated that the material was present and had not migrated. On January 29, 1979, a meeting was held in Washington, D. C. between representatives of the State of North Carolina and EPA officials to discuss the current PCB regulations and to discuss alternative solutions. On February 6, the State of North Carolina filed petition with EPA to amend the rules under the Toxic Substances Control Act to allow consideration of alternate methods of treatment.

On February 15, 1979, a test was run on a contaminated section of NC 210 in Johnston County and on March 22, on a contaminated section of SR 1004 in Alamance County to determine the feasibility of utilizing the theory of PCB fixation with activated carbon.

On June 4, 1979, the EPA Administrator, Douglas Costle, ruled against the petition of February 6 to change the regulations to allow consideration of alternate methods of treatment. The Region IV EPA Administrator, John White, on June 4, 1979 approved the State's application to construct a landfill in Warren County for disposal of the PCB contaminated soil (see Appendix C).

C. Purpose of Action

1. Definition of PCBs[1]

PCBs (polychlorinated biphenyls) are a class of chlorinated, aromatic compounds which have found widespread application because of their general stabilities and dielectric properties. PCBs have been prepared industrially since 1929 and are now produced in many foreign industrial countries. The Monsanto Company's preparations of PCBs were termed "the Aroclors". Production of PCBs ceased in the United States in mid 1977.

The outstanding physical and chemical characteristics of PCBs are their thermal stabilities, resistance to oxidation, acid, bases, and other chemical agents as well as their excellent dielectric (electrically insulating) properties. These and other properties have led to numerous uses of PCB such as dielectric fluids (in capacitors and transformers), industrial fluids (use in hydraulic systems, gas turbines, and vacuum pumps), and plasticizers (adhesives, textiles, surface coating, sealants, printing, and copy paper).

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[1]Hutzinger O. et. al., Chemistry of PCBs, CRC Pres Cleveland Ohio, 1974.

PCBs were prepared industrially by the chlorination of biphenyls with anhydrous chlorine, using iron filings or ferric chloride as catalysts. The crude product was generally purified to remove color, traces of hydrogen chloride, and catalyst which was usually achieved by treatment with alkali and distillation. The resulting product was a complicated mixture of chlorophenyls with different numbers of chlorine atoms per molecule. (This fact is responsible for the physical state of PCB preparations). Most individual chlorophenyls are solid at room temperature whereas commercial mixtures are mobile oils.

The most important physical properties of PCBs from an environmental point-of-view are solubility and vapor pressure. The solubility of PCBs in water is low and decreases with increasing chlorine content. Values given by Monsanto are 200 ppb (parts per billion) for Aroclor 1242, 100 ppb for Aroclor 1248, 40 ppb for Aroclor 1254, and 25 ppb for Aroclor 1260. Studies on the solubility of PCB in water are complicated by the fact that these compounds are strongly sorbed onto various surfaces. PCB has been shown to sorb relatively rapidly onto charcoal, plastic, glass, and silt or soil particles.

PCBs have a high specific gravity (Aroclor 1260/ 1.566) and a relatively high density (Aroclors 1260 weighs 13.50 lbs./gallon at 25°C). Loss of PCB by evaporation is extremely slow, i.e. Arcoclor 1260 exposed to 100°C for six hours would have an evaporation loss of 0 to 0.1%. PCBs are very stable at high temperatures. A temperature of 2000°C or greater is necessary before these chemicals are destroyed.

In summary, PCB compounds have been manufactured and used in this county since 1929. Their uses have varied from the manufacture of many household products to industrial uses. PCBs are very stable heat resistant compounds that are fat soluble and some are known to build up in biological food chains. PCBs are relatively insoluble in water but have strong absorption properties onto such materials as clay, soot, charcoal, and grease. PCBs are found in a wide variety of substrates throughout our environment.

2. Regulations Pertaining to PCB Spills

The Environmental Protection Agency has promulgated rules and regulations pursuant to the Toxic Substance Control Act to protect the environment from further contamination by PCBs resulting from improper handling and disposal of PCBs. Title 40 Part 761.10 (b) (3) of the Toxic Substances Control Act spells out disposal

requirements of PCB mixtures in soil. The regulation initially defined PCBs to mean any mixture with 500 parts per million (PPM) of PCB. This regulation was amended effective July 2, 1979. The amendment in 40 C.F.R. 761.1(b) lowered the concentration of PCBs which are covered by the regulation from 500 ppm to 50 ppm (Federal Register, Vol. 44, No. 106, May 31, 1979). The regulation requires that soil and debris contaminated with PCBs must be disposed of either through incineration or in a chemical waste landfill.

Criterion for any such landfill is contained in Annex II to the referenced regulation. Specific wording in C.F.R. 40, Part 761.10 (b)(3) is as follows:

> "Soil and debris which have been contaminated with PCB as a result of a spill or as a result of placement of PCBs in a disposal site prior to the publication date of these regulations shall be disposed of
>
> (i) In an incinerator which complies with Annex I, or
>
> (ii) In a chemical waste landfill."

The State of North Carolina petitioned the USEPA for a change in the disposal requirements for PCB mixtures in 40 C.F.R. 761.10 (b)(3). North Carolina requested that the regional administrator be allowed to approve methods of disposal other than incineration or landfilling. The petition for a rule change was denied by EPA on June 4, 1979.

3. Need for the Proposed Action

In early August, 1978, the Water Quality Operations Branch received a call from a Johnston County resident pertaining to an apparent chemical spill along the roadway shoulders of NC 210. Grass, soil and water samples were collected from the spill site and analyzed. The laboratory analysis identified the material taken from the roadway shoulders as Aroclor 1260 a polychlorinated biphenyl (PCB) substance. Reports of other chemical spills along sections of roadway in various counties were reported and investigated in the first week of August.

Because the initial sampling procedure only gave gross approximation to the concentration of PCB material, a more detailed soil sampling and analysis procedure was performed during late January, 1979. The soil samples taken served to quantify the PCB as to the

level of concentration along the roadway and to determine the depth in the soil column the PCB substance had penetrated.

The deliberate discharge of industrial waste material containing polychlorinated biphenyl substance onto the roadway shoulders was identified in fourteen counties of the state. The 211 shouders miles of roadway on which the spills occurred were grouped to form 15 spill site locations. Appendix A contains county maps showing the locations where the PCB industrial waste material was discharged onto the roadway shoulders. Appendix A also contains descriptions of the sampling site locations and the soil sampling results in terms of mg/kg of Aroclor 1260, a PCB substance.

Polychlorinated biphenyls are highly stable compounds that will remain unchanged in the environment for a very long time. PCB will biologically magnify in food chains and accumulate in the fatty tissue of both humans and animals. The long term effects of human and animal exposure to low levels of PCBs are not clearly documented; however, studies using laboratory animals have shown potential chronic effects such as cancer induction, pigmentation, and behavioral changes. The PCB contaminated soil may become translocated into adjacent agricultural crop lands and may have an impact on agricultural cash crops such as tobacco, feed and forage, and crops for human consumption. The State of North Carolina considers the removal of the PCB contaminated soil a necessary action to insure the protection of the natural and human environment.

In addition to the above reasons for removal of the PCB contaminated soil, the North Carolina Department of Transportation must periodically reshape shoulders and ditches adjacent to state highway system travelways in order to maintain safe egress for the traveling public and to maintain proper cross slopes for storm drainage. While these operations are closely followed by necessary erosion control measures to stabilize the loosened soil. There nevertheless follows a period of time during which the shoulders and ditches are susceptible to erosion. In addition normal deterioration of the highways caused by traffic, climate and age will require future modifications to the contaminated areas including resurfacing and possible widening and realignment of the highway facilities. All of these operations would tend to redistribute the contaminated soil in a manner which would be very difficult if not impossible to control.

The presence of PCB contaminated material along state highway system routes has caused the Department

of Transportation to disallow all encroachment requests along those roadway shoulders which involve activities requiring excavation or redistribution of the soil structure. This has included placement of utilities and commercial and private driveway pipes. These activities involving the roadway shoulders are necessary in order to provide needed services to property owners located adjacent to PCB spill areas.

4. Estimated Cost for Removal and Disposal

The total estimated cost for removal of the PCB contaminated soil from approximately 211 shoulder miles of roadway and disposal of the soil in a chemical waste landfill to be constructed in Warren County is $1,580,000. A summary of the cost breakdown follows:

Removal From Roadway Shoulders	$ 365,000
Reshaping of Roadway Shoulders	250,000
Hauling of PCB Contaminated Soil to Disposal Site	350,000
Disposal Pit Construction	56,000
Leachate Collection System	14,000
Impermeable Clay Liner	48,000
Artificial Liner (30 mil)	150,000
Erosion Control & Equipment	63,000
Pit Closeout	100,000
Construction Monitoring	8,000
Engineering & Contingency	75,000
Land Acquisition	173,000
	$1,652,000

D. Description of Removal and Disposal Action

1. Soil Removal

Shortly after the PCB spills occurred, measures were taken to contain the PCB compound spilled along the roadway shoulders. An application of a 10% solution of activated carbon applied at the rate of approximately one gallon per square yard then followed by an application of liquid asphalt at the rate of approximately one-tenth of a gallon per square yard were applied to the roadway shoulders where the PCB spills have occurred. Figure 1 is a location map indicating the approximate location of the PCB spills. A more detailed description of the spill locations are included in Table 1 and Appendix A.

The activated carbon solution was utilized to bind the surface concentration of PCB by absorption of the PCBs into the pores of the activated carbon and retard dissipation into the surrounding environment. The liquid asphalt was applied to eliminate dusting of the


PERSON
GRANVILLE
VANCE
WARREN
ROANOKE RAPIDS
ROXBORO
CASWELL
OXFORD
HENDERSON
HALIFAX
ORANGE
DURHAM
FRANKLIN
NASH
EDGE
CHAPEL HILL
WAKE
ROCKY MOUNT
CHATHAM
RALEIGH
WILSON
JOHNSTON
WILSON
SANFORD
WAYNE
GREENE
SMITHFIELD
LEE
HARNETT
DUNN
GOLDSBORO
LENIOR
ABERDEEN
SAMPSON
DUPLIN
CLINTON
FAYETTE-VILLE
CUMBERLAND
ROBESON
N
E
LOCATION MAP
PCB SPILLS
FIGURE 1
0 5 10 20 30
SCALE OF MILES

TABLE 1

1. SR 1004, Alamance County - From Bethel Church north of Snow Camp to the Chatham County Line.
   Length: 5.00 shoulder miles

2. SR 1004, Chatham County - From Alamance County Line to SR 1346.
   Length: 2.22 shoulder miles

3. SR 1346, Chatham County - From intersection with SR 1004 to NC 87.
   Length: 11.16 shoulder miles

4. NC 87, Chatham County - From intersection with SR 1346 southerly.
   Length: approximately 1.42 shoulder miles

5. US 421, Chatham County - SR 2120 to Lee County Line.
   Length: 9.59 shoulder miles

6. SR 1006, Chatham County - Between NC 902 and NC 42.
   Length: 3.46 shoulder miles

7. NC 42, Chatham County - From Deep River (Lee County Line) to intersection with SR 1006.
   Length: 4.56 shoulder miles

8. NC 902, Chatham County - From SR 1006 to Rocky River.
   Length: 9.68 shoulder miles

9. SR 1146, Edgecombe County - From US 301 to SR 1135.
   Length: 2.40 shoulder miles

10. SR 1135, Edgecombe County - From SR 1146 to SR 1143.
    Length: 2.43 shoulder miles

11. SR 1143, Edgecombe County - From SR 1135 to SR 1141.
    Length: 0.51 shoulder miles

12. SR 1130, Edgecombe County - From SR 1003 to NC 43.
    Length: 1.33 shoulder miles

13. SR 1141, Edgecombe County - From SR 1143 to NC 43.
    Length: 1.43 shoulder miles

14. NC 44, Edgecombe County - From SR 1409 east 0.2 miles.
    Length: 0.23 shoulder miles

TABLE 1 (Cont'd)

15. NC 43, Edgecombe County - From SR 1130 to SR 1131.
Length: 0.87 shoulder miles

16. SR 1003, Edgecombe County - From NC 43 to Wilson County Line.
Length: 3.38 shoulder miles.

17. SR 1432 and SR 1436, Franklin County - From 1/2 mile east of Moulton to a point beyond Gupton, then traces to Centerville.
Length: 5.10 shoulder miles

18. NC 561, Franklin County - From Nash County Line to Centerville.
Length: 4.80 shoulder miles

19. NC 58, Franklin County - From Warren County Line to Nash County Line.
Length: 5.10 shoulder miles

20. NC 98, Franklin County - From Nash County Line to Bunn and approximately 5 miles west of Bunn.
Length: 4.70 shoulder miles

21. NC 97, Franklin County - From Wake County Line to Nash County Line.
Length: 0.90 shoulder miles

22. NC 96, Granville County - From just north of Oxford to NC 49.
Length: 15.2 shoulder miles

23. NC 49, Granville County - From NC 96 to Person County Line.
Length: 1.80 shoulder miles

24. SR 1315, Halifax County - 0.2 miles from NC 4 to 0.1 mile east of bridge.
Length: 1.03 shoulder miles

25. SR 1308, Halifax County - From 0.1 mile north of SR 1309 to 1.2 miles north.
Length: 1.18 shoulder miles

26. NC 4, Halifax County - From SR 1314 to SR 1308.
Length: 3.13 shoulder miles

27. NC 43, Halifax County - From Warren County Line to NC 561.
Length: 0.65 shoulder miles

TABLE 1 (Cont'd)

28. NC 561, Halifax County - From SR 1317 to Nash County Line.
Length: 3.58 shoulder miles

29. NC 87, Harnett County - From Lee County Line to NC 27.
Length: 5.30 shoulder miles

30. NC 27, Harnett County - From NC 87 to SR 1252.
Length: 12.00 shoulder miles

31. NC 210, Harnett County - From Johnston County Line to city limits of Angier.
Length: 1.82 shoulder miles

32. NC 210, Johnston County - From intersection with US 70 southerly to Harnett County Line. North side only.
Length: 17.00 shoulder miles

33. NC 42, Lee County - From intersection with SR 1322 to Deep River (Chatham County Line).
Length: 4.52 shoulder miles.

34. NC 87, Lee County - From Harnett County Line to US 421.
Length: 2.14 shoulder miles

35. NC 98, Nash County - From Franklin County Line to NC 231.
Length: 1.41 shoulder miles

36. NC 231, Nash County - From NC 98 to SR 1137.
Length: 0.94 shoulder miles

37. SR 1137, Nash County - From NC 231 to NC 97.
Length: 3.48 shoulder miles

38. NC 97, Nash County - From SR 1137 to Franklin County Line.
Length: 4.39 shoulder miles

39. NC 58, Nash County - From Nashville to Wilson County Line.
Length: 4.12 shoulder miles

40. NC 561, Nash County - From Franklin County Line to Halifax County Line.
Length: 0.7 shoulder miles

41. NC 97, Nash County - From NC 58 west 1 mile.
Length: 0.35 shoulder miles

42. NC 58, Nash County - From Franklin County Line to 3 miles north of Nashville.
Length: 4.11 shoulder miles

TABLE 1 (Cont'd)

43. NC 49, Person County - From Granville County Line to SR 1515.
Length: 4.24 shoulder miles

44. NC 96, Wake County - From 98 to Franklin County Line, to traces only.
Length: 0.30 shoulder miles

45. NC 97, Wake County - From Zebulon to Franklin County Line and from US 64 Bus. to Zebulon.
Length: 4.50 shoulder miles

46. NC 43, Warren County - From Liberia to Halifax County Line
Length: 6.40 shoulder miles

47. NC 58, Warren County - From intersection with NC 43 southerly to Franklin County - both sides.
Length: 19.25 shoulder miles

48. US 158, Warren County - Between Macon and Vaughan.
Length: 0.60 shoulder miles

49. SR 1407, Wilson County - From SR 1003 to SR 1002.
Length: 1.06 shoulder miles

50. SR 1419, Wilson County - From US 301 to SR 1003.
Length: 0.87 shoulder miles

51. SR 1003, Wilson County - From Edgecombe County Line to US 301 Bypass.
Length: 4.76 shoulder miles

Total Length: 210.97 shoulder miles.

activated carbon and to reduce run-off of the activated carbon caused by storm drainage. These applications also served to delineate the contaminated areas.

The proposed method of removing the PCB contaminated soil from the roadway shoulders will consist of the following sequential steps:

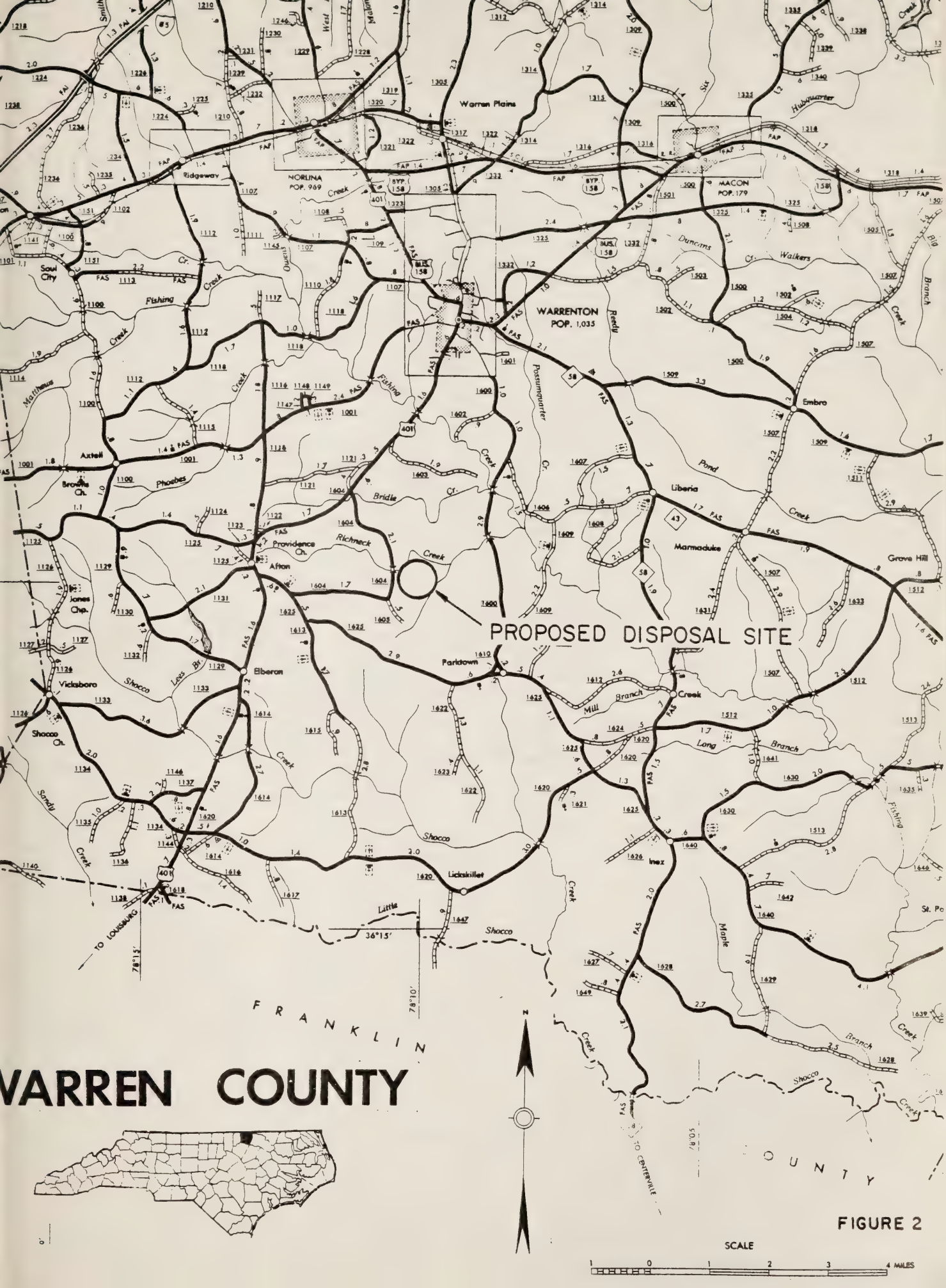
a. The contaminated area will be thoroughly wetted down with water, if necessary, in order to control dust during the removal and disposal operations. This may not be required during wet seasons, but on the other hand, may be required as much as 24 hours in advance during extremely dry conditions. This operation is recognized as extremely critical in the total removal operation and will be stringently controlled.

b. The contaminated shoulder area will be trenched out to a width of approximately 24"-30" from the edge of pavement, and approximately 3" deep by means of a motor grader equipped with a specially designed blade to allow for the cutting of a reasonable neat line trench, working with all motor grader wheels on the pavement. The trenched out material will be fed along the motor grader blade to form a windrow of material located inside the edge of pavement.

c. The windrow of contaminated material will be mechanically picked up and fed into trailing dump trucks by means of an Athey force-feed loader. This loader operation forces the contaminated material onto a self-contained belt conveyor by means of rotating paddles. The material is conveyed up the belt and dropped into dump trucks. A specially designed canvas shield will extend from the top of the belt down into the dump truck bodies to prevent wind drift of the contaminated material.

d. The Athey loader is designed to scrape the road surface; however, very thin amounts of residue will be left on the road surface following the loader operation.

Depending on soil moisture conditions, this residue will be either water sprayed back into the excavated trench or broomed, by means of a tractor mounted rotary broom or a combination of both spraying and brooming. Spraying will be performed by a Hydroseeder



WARREN COUNTY

FIGURE 2

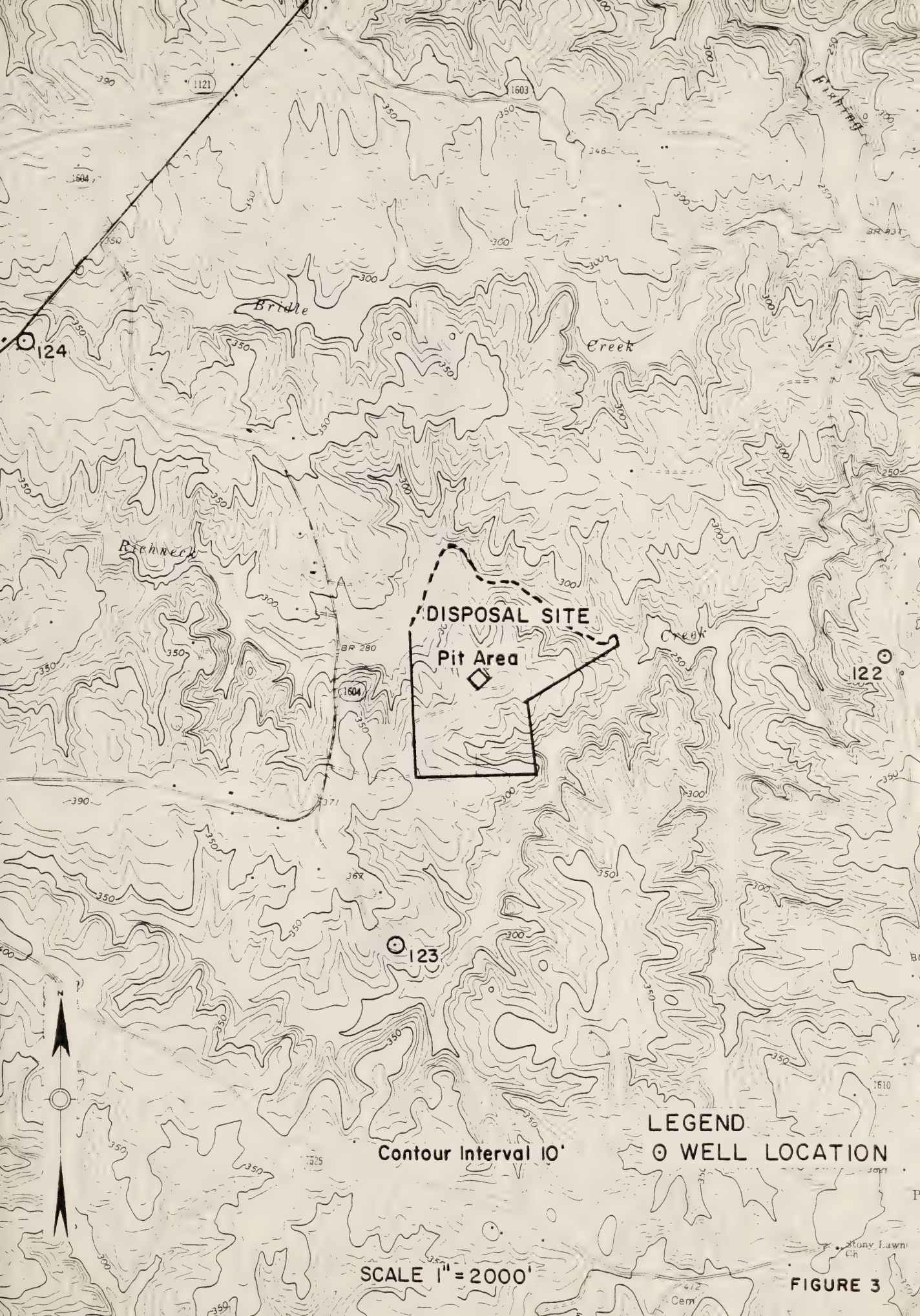
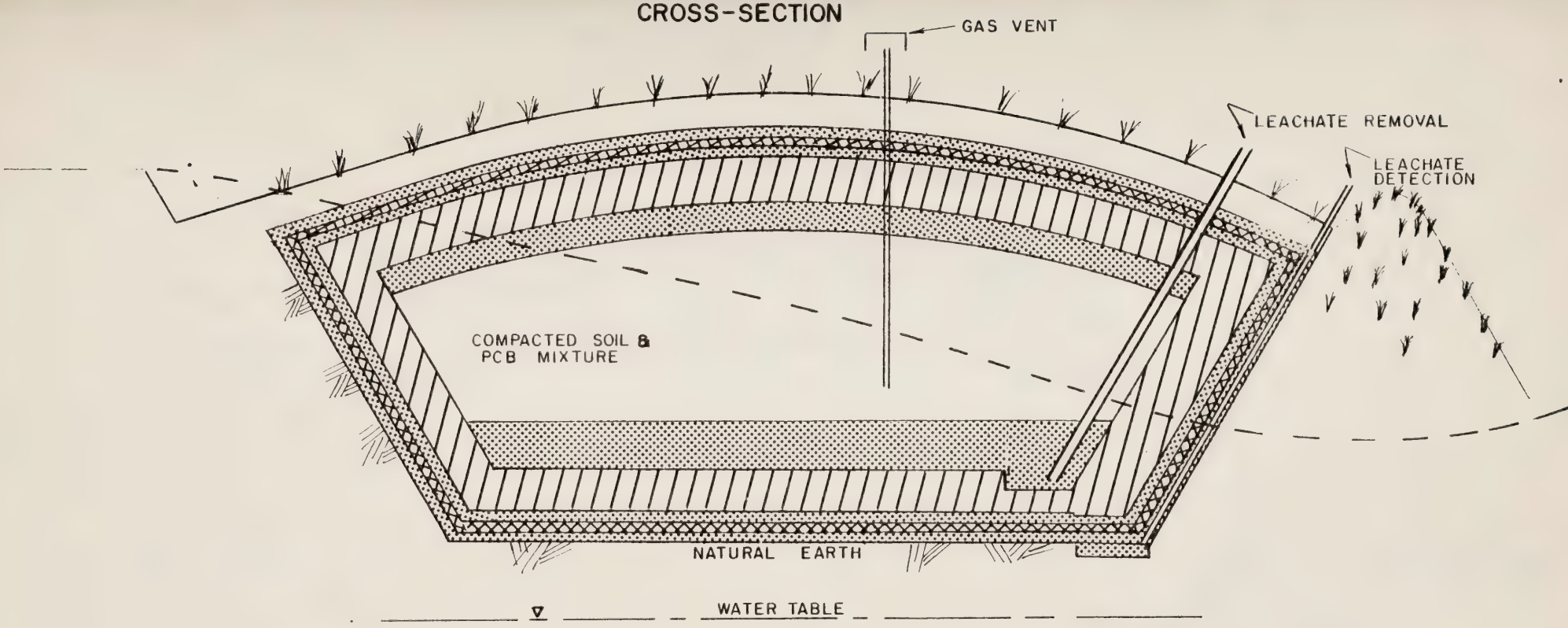

DISPOSAL SITE
Pit Area
124
123
122
Bridle
Creek
Richnech
Creek
Contour Interval 10'
LEGEND
⊙ WELL LOCATION
SCALE 1" = 2000'

FIGURE 3

CONCEPTUAL PLAN
CROSS-SECTION



NOT TO SCALE

- TOP SOIL
- LEACHATE COLLECTION SYSTEM & ARTIFICIAL LINER PROTECTOR
- ARTIFICIAL LINER
- CLAY LINER
- NATURAL EARTH
- — — ORIGINAL GROUND SURFACE

FIGURE 4

CONCEPTUAL PLAN
CROSS-SECTION
DETAIL

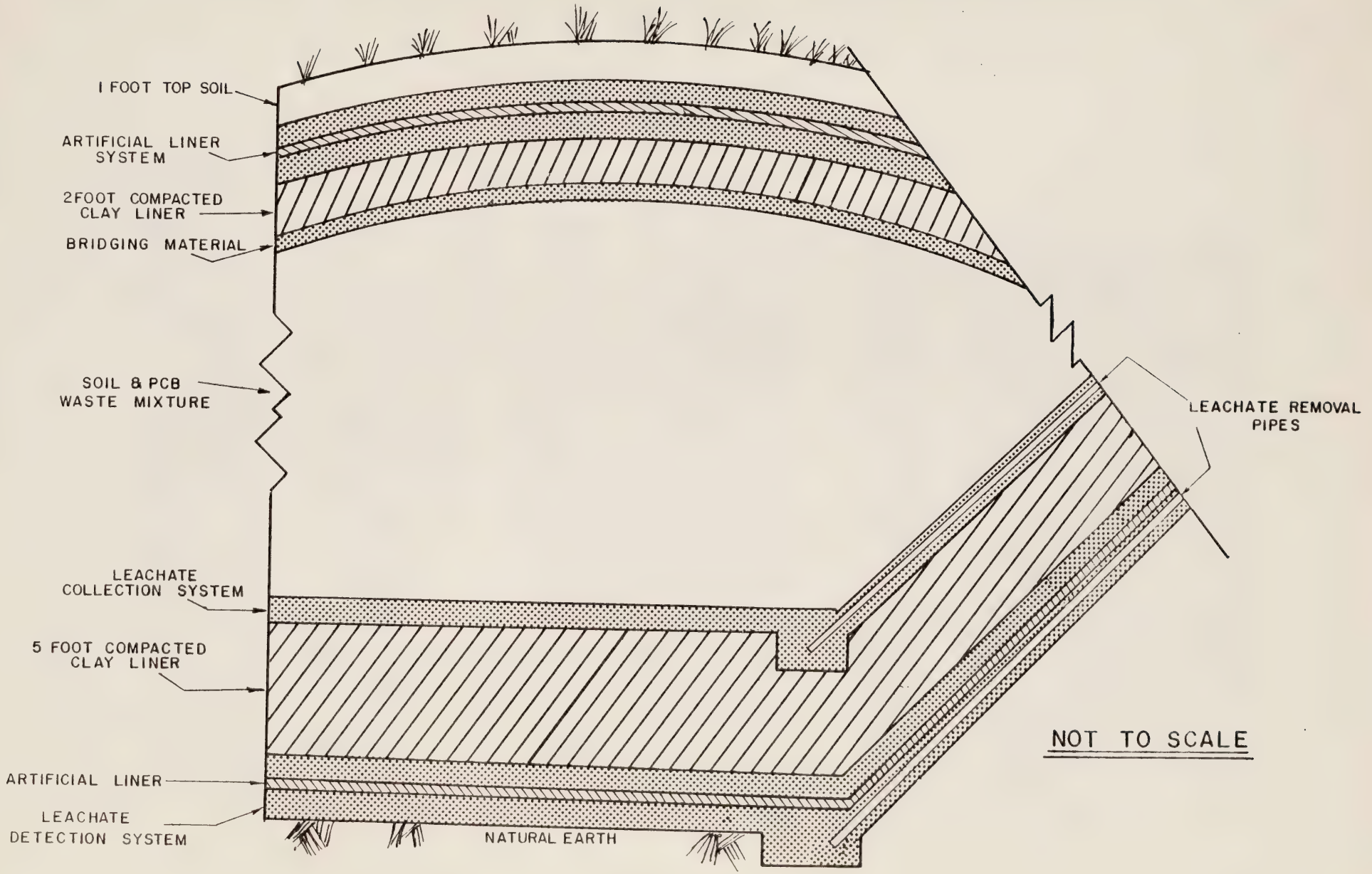


FIGURE 5

with especially designed adjustable outlet nozzles and the broom will be covered with a specially designed canvas cover to minimize dusting and wind drift.

e. Reshaping of the disturbed shoulder area will immediately follow the removal operation. Depending on the width and cross slope of the existing shoulder, reshaping will consist of either scarifying and reshaping of the shoulder by a motor grader, or filling in the excavated area with borrow soil material and shaping with a motor grader.

f. The shoulder reshaping operation will be followed by erosion control operations consisting of seed bed preparation, seeding, fertilizing and mulching of all disturbed areas.

2. Transport

Once the contaminated material is deposited in dump trucks, the dump bodies will be tightly covered with tarpaulins using elastic tie-downs. Insofar as possible and practical, contaminated material will be hauled to the disposal areas along rural routes, avoiding highly congested areas. Hauling of contaminated material will take place only during daylight hours.

Vehicles equipped with mobile radio units will routinely survey the haul routes for trucks with mechanical difficulty. In the event of mechanical trouble, mechanics will be radio dispatched.

3. Disposal Method

a. Construction Procedure

The disposal site for the PCB contaminated soil is located on approximately 142 acres of land in Warren County. The exact site location is shown on a County Map and a U. S. Geodetic Map (see Figure 2 & 3).

The State of North Carolina proposes to construct the PCB landfill in accordance with conceptual plans approved by EPA. Figures 4 and 5 are conceptual sketches of the landfill. Final construction plans must be approved by EPA. A general description of how the landfill will be constructed follows:

1. The facility will be designed such that excavation for the disposal site will not be closer than seven feet of the groundwater table as determined by on site soil borings and investigation of existing water table levels in the vicinity of the site.

2. Construct lower leachate detection system as a means of monitoring the artificial liner and compacted clay liner. The leachate detection system will consist of a porous material graded to a sump to allow removal of any liquid material.

3. Excavate and stockpile suitable soils which when compacted will have a maximum permeability of $1x10^{-7}$ cm/sec. Selection of suitable soils is to be monitored by a qualified soils engineer.

4. Prepare surfaces and install 30 mil artificial liner and liner protection materials along bottom and sides of pit.

5. Construct compacted clay liner in the bottom of the pit and along the side slopes of the disposal pit.

6. Place a layer of high permeability material over the compacted clay and grade to a sump area for collection and removal of leachate.

7. The soil contaminated with PCB waste will be placed on top of the leachate collection system in lifts as described in the operations plan.

8. After placement of all the PCB contaminated soil, a layer of bridging material will be placed then a two foot compacted clay liner will be constructed.

9. An artificial liner and protection materials will then be installed over the clay cap layer.

10. A foot of topsoil will be placed and graded for surface drainage. The ground surface of the landfill will then be prepared and seeded according to Soil Conservation Service recommendations.

11. All surface drainage during construction and after completion will be diverted from the landfill surfaces.

b. Operational Plan

(1) Excavation

All necessary precautions and protective measures will be implemented to maintain integrity of the artificial liner. The back-fill and placing of PCB contaminated soil will be completed as follows: Two ten-foot lifts will be used. The trucks will back into the open end of the pit and place the waste as near to working face as possible without the truck wheels getting on the waste. Tracked or rubber tired equipment will be used to push and compact the waste into place. the waste will be compacted to the maximum extent practicable. Clean earth will be placed on the floor of the pit as needed to keep the trucks out of the waste. The leachate collection system will be constructed as placement of first lift progresses. A 1-foot layer of clean earth will be placed over the middle 20 to 30 feet of the first lift so the trucks can be on a clean surface and the second lift will be completed as the first. After the second lift has been completed, including placing the residue from the runoff collection system, the open end of the pit will be completely closed. A minimum of one foot of clean soil will be placed on top of the waste and graded to two percent slope from the center toward the trench perimeters. A ten mil plastic cover will be placed over this one foot of soil. A 2 foot layer of compacted clay soil will be placed over this cover, 12 inches of top soil will be placed over the clay soil, graded to approximately two percent and seeded for erosion control. Additional erosion control measures will be installed as required by the Division of Land Resources Department of Natural Resources and Community Development. A gas vent will be installed to prevent gas build-up and rupture of the artificial liner.

(2) Surface Runoff

During the process of placing the PCB contaminated soil in the disposal pit, surface runoff from the pit area will be collected in a holding pond. In accordance with 40 C.F.R. 761.41(B)(4)(ii) the holding pond will be capable of diverting surface runoff from the pit area for a 24-hour 25-year storm. The water and silt collected in the

holding pond will be analyzed for PCB and if negative the water will be released to surface drainage. If the analysis for PCB is positive, the water will be processed through a carbon filter prior to release. The carbon filter, and the silt in the holding pond will be placed in the disposal pit prior to final closing. Since the PCB disposal site is located above the 100 year flood plain, no flood diversion structures are required after completion of the PCB landfill operation. Surface run-on at the site will be diverted by grading the vegetative cover for the PCB landfill to topographical lows along the perimeter of the landfill site.

(3) Leachate Collection and Detection Systems

Two leachate collection systems will be installed. One system above the clay liner and another below the artificial liner. The leachate collection system will consist of a highly permeable material with PVC pipe for access and removal of any collected leachate. The leachate will be tested for PCB contamination. If the leachate contains PCB particles and depending on the concentrations found, the leachate material will be disposed of in an EPA approved PCB incinerator.

(4) Sampling and Monitoring

Three monitoring wells will be placed on a line through the site. One of the wells will be located above the disposal pit and two below, with one of the wells located at the area with the lowest groundwater. The leachate collection systems will be monitored monthly by the N. C. Department of Human Resources. The receiving surface water in the vicinity of the pit will be monitored biannually by the N. C. Department of Human Resources. The disposal site will be monitored as long as required by EPA.

(5) Supportive Facilities

A six foot chain link fence with barbed wire topping will be installed approximately 200 feet from the perimeter of the disposal pit to prevent unauthorized persons and animals from entering. The site will be periodically inspected and maintained in a manner to insure security and to prevent hazardous conditions from developing.

c. Estimated Waste Volume

The landfill site will be constructed to accommodate up to 40,000 cubic yards of soil contaminated with PCBs.

E. Description of Environmental Setting

1. Roadside

The discharge of material containing PCBs occurred on approximately 211 shoulder miles of North Carolina highways. The PCB spills have been identified in 14 counties. See Figure 1 for a general location of the spill areas. The discharge of material containing PCBs occurred mainly in rural areas on the roadway shoulder within 24 inches of the pavement edge.

2. Disposal Site

a. Location and General Description

The proposed disposal site is located in the northeastern North Carolina Piedmont Plateau of Warren County, approximately four miles south of Warrenton. See Figure 2 for a county map showing the site location.

The proposed disposal site consists of approximately 142 acres of which about five acres will be used for the actual disposal of the soil contaminated with PCBs. The remaining acreage will serve as a buffer zone for the disposal area.

b. Hydrology-Topography

Surface water discharges are controlled by the topographic position of the land. The proposed disposal area occupies the crest of a gently sloping upland ridge which has 70 to 80 feet of relief. Surface water discharge from the site is toward seven draws located in a radial pattern around the site. See Figure 7 for surface drainage patterns. Two large draws immediately Northeast, and West of the site receive the major portion of surface run-off. Exposed clayey subsoils, topographic position and side slopes tend to minimize surface water infiltration and maximize surface water run-off.

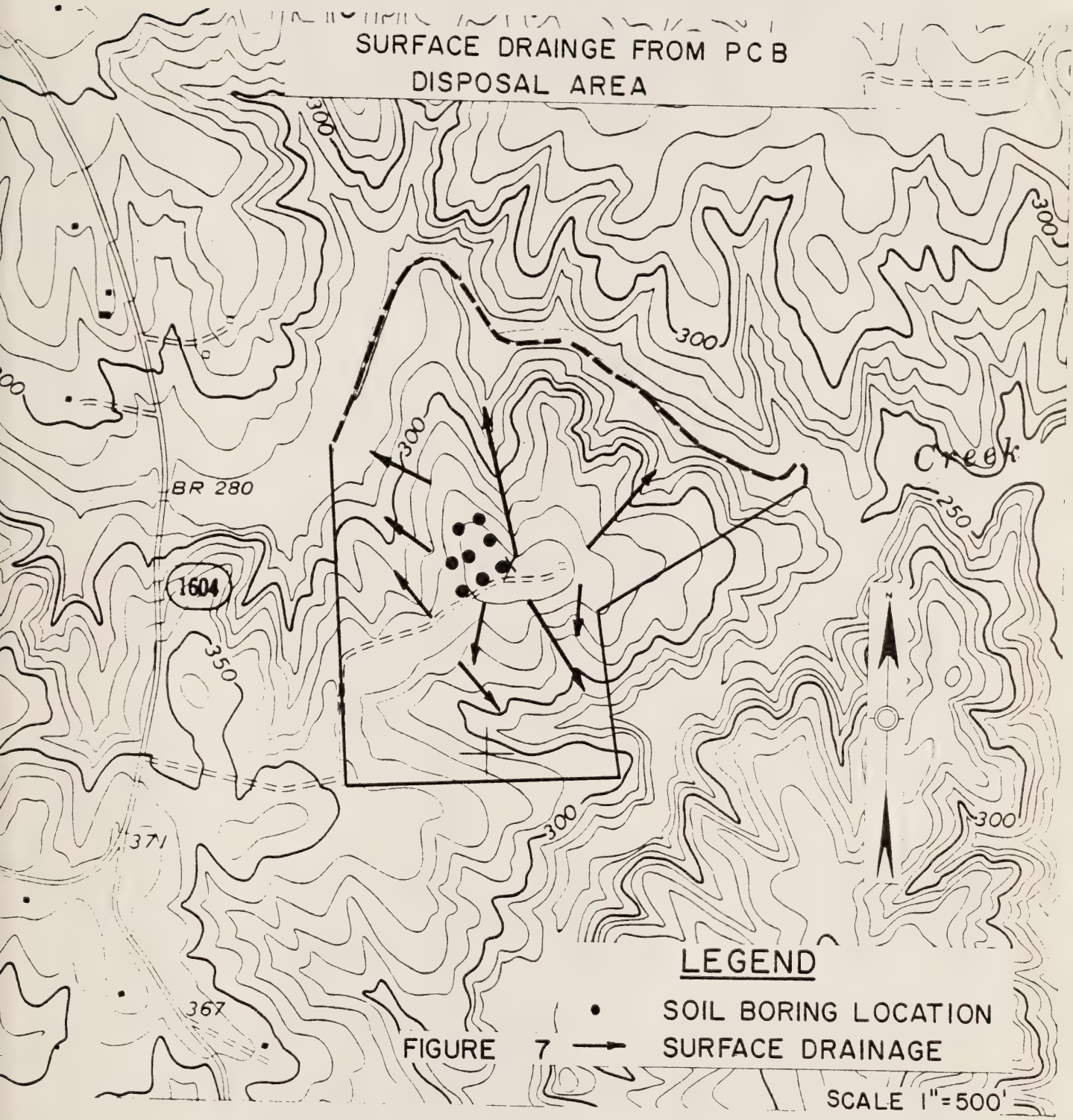

SURFACE DRAINGE FROM PCB
DISPOSAL AREA
300
300
300
300
300
300
Creek
250
BR 280
1604
350
371
367
LEGEND
SOIL BORING LOCATION
SURFACE DRAINAGE
SCALE 1"=500'

FIGURE 7

Surface water discharge is to Richneck Creek and an unnamed tributary to Richneck Creek via draws around the site. Richneck Creek discharges to Fishing Creek. The confluence of Richneck and Fishing Creek is approximately 3 miles downstream and Southeast of the Warrenton raw water intake. Stream classifications for Richneck Creek and Fishing Creek in the discharge area is class C. Approximately 40 miles separate the site discharge area and the closest raw water intake.

U. S. Geological Survey Flood Records of N. C. streams indicate that the 100-year flood elevation is not more than 8 feet above average water levels in Richneck Creek and its tributaries. The site is 70 to 80 feet above these streams and not subject to flooding.

Recharge of groundwater resulting from surface water infiltration and percolation is estimated to be low. There should be no significant fluctuation in water table elevations beneath the ridge occupied by the disposal site. All features on the site which enhance surface run-off reduce groundwater recharge. Rapid run-off and the relatively small area of gently sloping ridge crest minimizes the volume of precipitation available for infiltration and recharge. The close proximity of 2 deep draws for ground water discharge and the relative low retention and water storage capacity of deep subsurface weathered rock (silty sand and sandy silt) indicates a low potential for buildup of any significant hydraulic head or water table below the ridge. The net effect of constructing impermeable barriers on the ridge crest and diverting any off-site surface water will be to further reduce the potential for mounding of groundwater below the site.

Precipitation data from the U. S. Weather Bureau Station at Arcola in Warren County indicated, that at the time of the September study, rainfall in Warren County was approximately 5% greater than the preceding 5 year average. There were no observed evidence of reduced soil colors or mottling of soil colors to indicate the presence of a permanent water table. At the time of the boring, no water table was observed at the 42 foot depth. It is concluded that the water encountered in the September study was a result of normal vertical movement of percolating surface water rather than ground water tables.

Representative Hydrographs of wells in Warren County indicate that during September ground water levels are declining. Ground water levels are at maximum elevations during the period from January to April. Borings performed during February 1, 1979 by the consulting firm of Soil & Material Engineers Inc. indicated a static water level of approximately 303' to 306' in elevation or 37 to 32 feet below land surface. Boring depths were 45' below land surface. In the Warren Section of the report title "Geology and Ground Water Resources in the Raleigh Area", compiled by the U. S. Geological Survey, the static water level of well number 122 was measured to be 47' below land surface. For location of well number 122 see Figure 3. This well is similar to the disposal site borings with respect to elevation, topographic position and time of water level recordation. Hydrographs of observations wells in Warren County show ground water fluctuations from approximately 5 to 11 feet. The study conducted by the firm Soils & Materials Engineers Inc. was carried out during the middle portion of maximum seasonal fluctuation of ground water. The measured elevation of groundwater in February, 1979, was 303 to 306 feet. Ground water elevations could be predicted to rise an additional 5 to 6 feet. The predicted highest ground water elevation would be 309 to 312 feet. Maximum surface elevation in the disposal area is 343 feet. The highest predicted water table elevation is 31 feet below land surface which would allow a maximum excavation depth of 24' to remain 7' from the high water table elevations. Construction of a clay liner would afford a 14 foot separation from the high water elevation.

c. Soil Conditions

Soils on the site are characterized within the standardized engineering concept of surficial earth materials. Procedures established by the American Association of State Highway Officials (AASHO) and the American Society for Testing Materials (ASTM) were utilized for soil evaluation. The N. C. Department of Transportation and Soil & Material Engineers, Inc. independently evaluated site conditions and performed pertinent field and laboratory analysis on materials obtained from 19 soil borings in the disposal area.

Surficial soils on the site consists of red-brown silty clays. The top soil on the site is significantly eroded but where present extends to a depth of 3 to 6 inches. Subsoils are clayey

and silty and extend to depths of 38 to 45 feet. In general, a gradual transition exist between upper silty clays and deeper clayey silts. Observations of soil borings on site indicate that the clayey silts grade into sandy silts and silty sands. The general stratifications of clays overlying silts which grade to fine sands is typical of the Piedmont province. Detailed analysis of the soil materials were performed by the N. C. Department of Transportation laboratory and Soil & Material Engineers, Inc. The two laboratory analysis indicated an upper layer of clayey soils ranging in depth from 0 to 38 feet below land surface. Soils at the 45' maximum drilling depth were classified as silty sands and sandy silts.

Standard Engineering laboratory tests for maximum density at optimum moisture and permeability at 95 and 100 percent maximum density were performed on the soils. At 95% maximum density the permeability of 1.9×10^{-7} cm/sec and minimum permeability of 1.8×10^{-8} cm/sec. At 100 percent maximum density no permeability was greater than 1.0×10^{-7} cm/sec. The 8 acres encompassed by detailed soil borings and analysis demonstrates that 50,000 to 75,000 cubic yards of clayey materials are available to construct highly impermeable soil liners.

d. Environmental Profile

The proposed disposal site occurs on open, rolling cultivated land presently utilized for soybean production. In addition to the soybeans, various weeds and grasses have been observed growing on the proposed disposal site and include such species as foxtail, ground cherry, thistle, broomsedge, ragweed, aster, and horseweed. Mixed deciduous hardwoods in association with pine occur on the periphery of the soybean field. Oaks including white, southern red, blac, and post, red maple, sweetgum, tulip poplar, hickory and loblolly pine are the major canopy species present. Understory species consists of redbud, dogwood, American holly, red cedar, and winged sumac scattered among small shrubs, saplings and vines - primarily honeysuckle.

II. ALTERNATIVES TO THE PROPOSED ACTION AND THEIR POTENTIAL IMPACTS

A. Procedures Utilized to Evaluate Alternative Disposal Site Locations

The North Carolina Department of Human Resources, Division of Health Services conducted a site search for potential land areas that would be suitable for the permanent storage of the PCB contaminated soil. The objective of the investigation was to evaluate available State and offered private property for potential usage as disposal sites. It was anticipated that several suitable sites could be located. A set of general guidelines was developed to assist in the evaluation of potential sites.

The following is an outline of general site criteria and EPA technical requirements utilized in the location and evaluation of potential disposal sites for the PCB contaminated soil.

1. General Area of Potential Site Locations

The search for potential disposal sites was generally limited to an area bounded by the counties where the PCB spills had occurred. Areas east of the spills were generally eliminated due to evidence of seasonal high ground water levels relatively close to land surface. Potential sites in areas of the western portion of the State were given a low priority due to the long haul distances.

2. General Site Screening & Evaluation Procedures

(a) Site Relief

A PCB chemical waste landfill should be located in an area that provides low to moderate topographic relief to prevent landslides or slumping. Aerial photographs, U. S. Geological Survey topography maps and field measured elevations were utilized to evaluate site relief suitability. Sites with potential of land slumping resulting from required construction activity were rejected.

(b) Topographic Position

Hill, flat, slope and draw are the four basic topographic positions for surface features. Wells installed on hill or ridge positions normally exhibit the lowest average yield of ground water per foot of well. Hill or ridge positions are also amenable to diversion of surface water and control of local recharge to ground water by

minimizing areas available for recharge. Hilltop and ridge were assigned a high priority for topographic position. Sites predominated by draws or difficult to manage slope position were rejected. U. S. Geological Survey topographic maps and on-site evaluations were used to determine topographic position suitability.

(c) Soils

Surficial soils are formed by weathering of subsurface geological rock formations. The characteristics of the surficial soils are determined by the chemical and physical properties of underlying rock formations. Therefore, detailed geological maps of specific areas and State and County soil surveys were used to delineate sites with potentially suitable soils. Site specific surface evaluations, soil borings and field & laboratory testing of soil materials were performed on sites with reasonable probability of meeting the high silt and clay content parameters for PCB chemical waste landfills. Sites with sandy surface soils, rock outcrops or exposed boulders, surficial soils with shallow depth to bed rock and insufficient on-site soils for clay liners were rejected. Surficial soils contained within the landfill site which could not meet the following EPA technical requirements were rejected.

(1) permeability 1.0×10^{-7} cm/sec.
(2) percent passing no. 200 seive ≥ 30
(3) plasticity index ≥ 15

(d) Hydrology

Potential contamination of ground or surface water were major considerations for screening all sites. Any site that could not be designed to prevent hydraulic connection between the PCB contaminated soils and surface streams or springs and ground water was rejected. Sites within the 100-year floodplain, within close proximity of a class I or II reservoir utilized as a public water supply or within ½ mile of an A-II stream as designated by the D.E.M. were rejected. A separation distance of 500 feet from the site and water supply wells was used as a site screening parameter. The depth to ground water would limit the depth of excavation and total storage volume of a given site. The standard for site evaluations with respect to ground water separation was 50 feet. It was acknowledge during the site evaluation process that the probability of locating

sites with ground water levels below 50' from land surface would be difficult if not impossible. Therefore, sites were screened according to the predicted or measured minimum depth from land surface to the upper limits of ground water tables. Transmissivity, gradients and discharge areas for ground water were considered in site evaluations.

Ground water fluctuations were predicted from data generated by U. S. Geological Survey publications on geology and ground water resources and field observations or measurements. Predicted, observed or measured upward fluctuation of ground water resulting in relatively shallow water tables would cause a site to be rejected. Rainfall and evaporation data from the U. S. Weather Bureau in combination with U. S. Geological Reports and field measurements were used to predict the maximum upper fluctuation from the measured static water levels on sites that were drilled.

(e) Site Size

The disposal site for the PCB contaminated soil should be large enough to allow adequate construction and protection of the disposal area. Considerations for sizing a site include: construction of disposal pit; storage area for stockpiling borrow materials to allow separation of earth liner, topsoils, leachate collection and spoil materials; access and turn around area for haul vehicles, separate sedimentation ponds for runoff from disposal pit and soil stockpile areas; areas for installation of monitoring wells up gradient and down gradient of disposal pit; berms or ditching for diversion of surface water and a buffer and security zone. A minimum 16-20 acres in a fairly regular configuration was the rejection criteria for site size.

(f) Access

Sites with deeded right-of-ways were assigned higher priority than sites with no road frontage, no deeded right-of-ways or property access by easement. Consideration was also given to the length and construction difficulty of access roads from state maintained roads to the disposal pit.

(g) Isolation of Site

Population densities within 1 mile of proposed sites and sites which would require transportation of the PCB contaminated soil through highly popu-

lated areas were considered for site evaluations. The objective of this standard was to locate sites which would impact the least number of citizens during transportation and disposal.

B. Alternative Sites Evaluated

1. Total Sites Evaluated

The above outlined standards were utilized to evaluate approximately 90 sites in 20 counties. Every available tract of state-owned land considered to be a possible candidate as a site to receive PCB contaminated soil was investigated. These included properties assigned to the National Guard, institutions, tower sites, prison property experimental farms, state parks, state forests, utility-owned property and properties under Department of Transportation jurisdiction. Federal property on the Fort Bragg military reservation was also evaluated.

The remaining sites were offered for evaluation by private individuals and corporations, and county governments.

2. Site Rejection

Approximately 90 percent of all potential sites were eliminated due to violation of one or a combination of evaluation standards. A majority of the sites were eliminated due to the location with respect to private or public water supply reservoirs, intakes and wells; high water tables and unsuitable soil characteristics. The range of site evaluations included sites from 1.5 to 1300 acres; soils from highly impermeable saturated marine clay materials in Wilson County and impermeable clay stone pits in the Triassic Basin to sand dune surficial deposits on the Fort Bragg Military Reservation. Water table elevations varied from 3' to greater than 40' below land surface. Topographic positions varied from relatively flat areas to areas with greater than 30 degree side slopes and population densities from a few homes per square mile to hundreds within a mile of the site.

Eleven of the total available sites were considered to have a high probability for meeting the criteria for PCB chemical landfills. Detailed soil borings and subsurface investigations were made on these eleven sites. Table II lists these eleven sites. Sites in Franklin County, the Nash County Prison Site, the Wake County Prison Site, Chatham County Brick Plant site and the Harnett County D.O.T. Borrow Pit site were rejected from subsurface investigations. The remaining 6 sites

in Person, Warren, Nash, Wake, Chatham and Granville Counties were evaluated by EPA and State personnel. Consideration was given to multiple site distribution by development of these sites; however 4 of the sites were rejected and more detailed subsurface analysis were required on the Chatham and Warren sites.

Maximum density, permeability at 95% maximum dry density and optimum moisture tests, volume of material suitable for clayey liners and water table monitoring test were performed on the Chatham and Warren sites. Both sites afforded essentially equivalent evaluations. The Chatham County site was unavailable for purchase by the State for development as a PCB chemical landfill and therefore rejected from further considerations.

In order to increase the disposal site alternatives requests were made by the State to County Boards of Commissioners for permission to evaluate existing sanitary landfill sites as potential sites for disposal of the PCB contaminated soil. Table III illustrates the result of subsurface evaluations for suitable soil materials and water table elevations. The sanitary landfill sites were either unsuitable for development or were unavailable for development as a PCB chemical landfill.

3. Selected Site

Of the six most suitable sites located in Nash, Person, Wake, Granville, Chatham and Warren counties the Warren County site on SR 1604 demonstrated the least restrictions and the greatest degree of protection of the public health and environment. Additional tests were performed by an independent consulting firm to confirm the state's evaluation of the site. Application was made to EPA for site approval for this site to be developed into a disposal site for the PCB contaminated soil. Site and conceptual plan approval was granted.

TABLE II

DETAILED EVALUATION OF ELEVEN POTENTIALLY SUITABLE SITES FOR DISPOSAL OF TOTAL PCB CONTAMINATED SOIL VOLUME

COUNTY	USE-LOCATION	EVALUATION COMMENTS
Franklin	Prison Property NC 39 South of Bunn	Static water level within 10 feet of land surface
Nash	Prison Property US 64 Nashville	Water table fluctuation to within 15 feet of land surface, 44 percent of soil volume did not meet EPA soil criteria, access through prison confinement area
Wake	Prison Property, Blue Ridge Road	Water level within 8.0 feet of land surface
Chatham	Cherokee Brick Plant SR 1916	Shallow surface rock seams, site not available for purchase
Harnett	DOT Borrow Pit SR 1229	Static water table within 10 feet of land surface
Nash	Private Woodland on SR 1004 South of SR 1401 Junction	Surficial soils too sandy, shallow to rock
Person	Farmland, SR 1326	Close proximity to populated areas
Wake	NCSU Farm	Close proximity to populated areas
Granville	Farmland, SR 1300	Site access across undeeded right-of-way, property tied up in estate, practical auger refusal at 11.5 feet
Chatham	Sanitary Landfill US 64	Soil and water table data satisfactory, site suitable; site not available for purchase
Warren	Farmland SR 1604	Soil and water table data satisfactory

TABLE III

COUNTY LANDFILL SITES EVALUATED FOR PCB CHEMICAL WASTE LANDFILL

OUNTY	COMPACTED SOIL PERMEABILITY CM/SEC	WATER LEVEL FEET BELOW LAND SURFACE	EVALUATION COMMENTS
nett	1.3×10^{-5}	22'	Soils too permeable, Leased property & owner denied request for PCB disposal
ren	5.3×10^{-7}	13.8' - 20.6'	Site not available
	2.6×10^{-7}	6 - 8.7'	Water table near surface
nston	7.2×10^{-6}	7.5' - 19'	Soils too permeable, water table near surface
nklin	5.3×10^{-7}	none encountered	Rock 3', 7', 11' feet below surface
lifax	4.2×10^{-8}	14.3' - 18.6'	Water table near surface
nville	1.2×10^{-7}	22'	Rock 12' to 17' below surface
lson	6.9×10^{-9}	6' to 10'	Water table near surface
sh	7.3×10^{-8}	22'	Site not available for PCB disposal
gecombe	1.5×10^{-8}	6' - 15.3'	Site not available for PCB disposal
atham	2.7×10^{-7}	22' - 33'	Site not available for PCB disposal
amance			Site not available for evaluation
ke			Site not available for evaluation
rson			Site not available for evaluation

C. Alternative Method of Treatment In-Place

Tests were conducted to determine the feasibility of applying activated charcoal as a means of achieving long term fixation and containment of the PCB material within the highway shoulders. The in place treatment consisted of applying activated charcoal on the contaminated soil and then blending the activated charcoal material into the soil column of the highway shoulder. The disturbed areas would then be packed, seeded and reshaped. A continuous maintenance and inspection program would be performed to insure that erosion and soil migration did not occur.

A test was run on February 15, 1979 on a section of NC 210 in Johnston County and on March 22, on a section of SR 1004 in Alamance County. The test results indicated that vertical and horizontal mixing was accomplished with the average concentration being below the regulating requirement at that time of 500 ppm. The average concentration along the test section is above the current requirement of 50 ppm (amendment to 40 C.F.R. 761.1(b)).

During the test runs representative soil samples were taken by EPA at the Research Triangle Park to conduct studies of possible health effects. The EPA study which utilized rats for test purposes provided evidence that the carbon fixation process was not adequate and would not be an acceptable means of disposal.

Because EPA regulations prohibited in place treatment the State of North Carolina applied for a rule change to allow the regional administrator to approve in place treatment. The EPA administrator on June 4, 1979 denied the petition submitted by the State of North Carolina.

D. Alternative of Transportation to a PCB Material Incinerator

Three incinerators have been identified as having the capability to destroy the PCB material through incineration. These incinerators are located in New Jersey, Arkansas, and Texas. At the present time, these incinerators have not been issued permits by EPA which would authorized them to accept and dispose of PCB materials. Additionally, transportation and handling logistics would make this alternate cost prohibitive.

E. Alternative of Transportation To An Existing Chemical Waste Landfill

Consideration was given to transportating the PCB contaminated soil to an existing chemical landfill located in Alabama. This alternative was considered not feasible,

because of limited transportation resources, manpower requirements, and excessive cost of disposal estimated at $12.0 million, as well as the increased logistic problems.

F. Goodyear PCB Detoxification Process

Dr. R. H. Kline, scientist from the Research Division of the Goodyear Tire and Rubber Company, was contacted to determine the feasibility of applying the recently developed Goodyear PCB detoxification process to the soil-PCB spill mixture in North Carolina. Dr. Kline stated that the process was designed for PCB fluids not absorbed PCB and solid mixtures. The only way the Goodyear process could be applied was to first extract the PCB from the soil mixture, and while extraction and detoxification was possible that it is not practical nor economical.

G. No Action (Do- Nothing Alternative)

The no action or "Do-Nothing" alternative was not considered to be a viable alternative because current EPA regulations require disposal of PCB contaminated soil which has concentrations greater than 50 parts per million. The rights of way of N. C. highways are generally used to provide driveway access to adjacent properties and to provide for placement of utility distribution systems. In addition, highway shoulders require periodic maintenance, enlargement and improvement to meet the transportation needs of the public.

None of these right of way activities can be undertaken without substantially increasing the risk of further distribution of PCBs in the environment by disturbing the contaminated soil. Even without such use of the rights of way, the normal usage of the highways will result in some PCBs being distributed in the environment due to vehicles intentionally or unintentionally being operated on the shoulders. It is felt to be in the public interest to remove the PCB contaminated soil from the highway shoulders so that the EPA regulations will be honored and so that the highways can be put to full public use without further distributing PCBs in the environment.

III. ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

A. Soil Removal

1. Air Quality[2]

a. Ambient Air Monitoring

Off-Road sampling sites were established at four locations along the proposed one mile (1.6 km) test site on NC 58 near Inez, Warren County, North Carolina. These sites were 30 m (100 ft) from the line of removal on either side of the highway and are desginated as sites A, B, C and D in Figure 8. Two additional air samplers were located on either side of the temporary storage site, about 2 m from the outer edge of the plastic soil liner. The storage area monitoring sites are designated E and F in the inset in Figure 8. Background samples were collected one day prior to the test dig at all sites except A and B. Power generator problems interferred with pre-dig sampling at these sites. All sites were monitored for 4 hours during the removal operation and again one week afterwards. During the removal operation, the air sampling was begun when the first vehicle (1st hydroseeder) of the removal train approached within 90 m (100 yds) of the appropriate pair of samplers. That is, samplers at sites A and B were started when the train came within 90 m and were operated for 4 hour beyond that time. The same procedure was used at sites C and D. At the storage site, sampling was begun when the first dump truck arrived and was continued for 4 hour.

Aroclor 1260 was found in the ambient atmosphere at all sites monitored. Air levels were generally in the 0.01 to 0.05 micrograms/m^3 range (see Figure 8) before, during and after the dig. This corresponds to 8 to 42 parts-per-trillion (wt/wt) for dry air at 20°C and 760 mm Hg. Several values were below 0.01 micrograms/m^3 and one was above 0.05 micrograms/m^3. The range 0.01-0.05 micrograms/m^3 constitutes normal levels of PCBs found in

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[2]The following Air Quality analysis and results are taken from "Studies Conducted In Connection with PCB Spills In North Carolina", Analytical Chemistry Branch, Environmental Toxicology Division, Health Effects Research Laboratory, U. S. Environmental Protection Agency, Research Triangle Park.

AMBIENT AIR MONITORING

AIRBORNE PCB* ($\mu g/m^3$)	SITE A			SITE B			SITE C			SITE D			SITE E			SITE F		
	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER
Less than 0.01								X	X			X						X
0.01 - 0.05			X		X	X	X			X	X		X	X	X	X	X	
More than 0.05		X																

* as Aroclor 1260 (0.06)

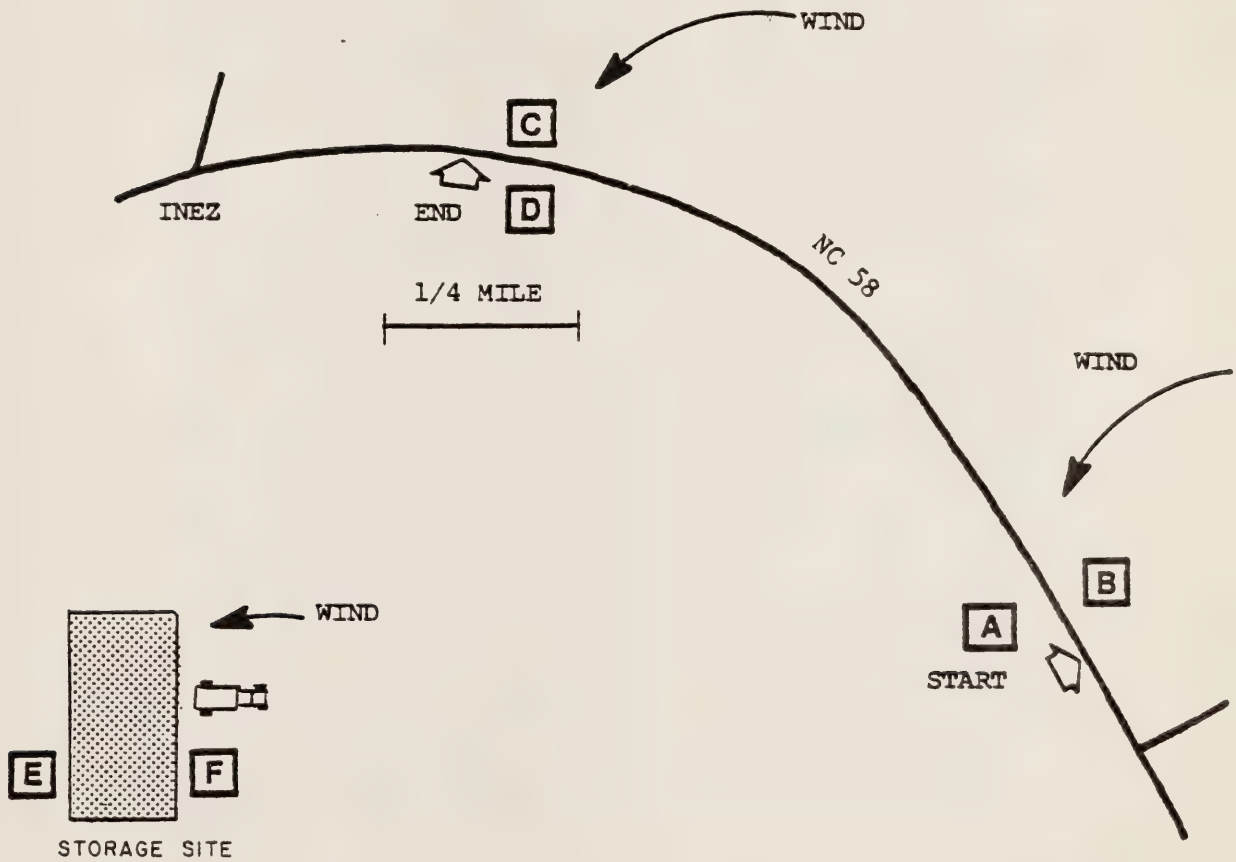


Figure 8 . Ambient air monitoring at Warren County test removal site.

most areas of the United States. However, atmospheric levels of PCBs in rural, non-industrialized areas such as that near Inez would be expected to fall into the 0.005 to 0.015 micrograms/m^3 range. The fact that levels are generally higher than this and the distribution matches that of Aroclor 1260 (PCBs in the ambient atmosphere usually more closely resemble Aroclor 1254) indicated that there was a specific source of Aroclor 1260 in the area.

The quantities of Aroclor 1260 collected as airborne dust and vapors are tabulated in Table 4. In most cases vapor levels were higher than dust levels. However, some of the particulate-bound PCB would be expected to volatize from the collection filter into the vapor trap during the 4 hour sampling period. In only one case was the PCB dust level found to be significantly greater than the vapor level. At site A, the only site where levels exceeded 0.05 micrograms/m^3, some 60% of the Aroclor 1260 was found on the particulate filter. This site was downwind from the highway and near the beginning of the digging operation. The initial sweeping of the road surface after pick-up of the excavated dirt was done without a preliminary water spray. The sweeper was observed to generate appreciable dust levels, which were swept by the wind in the direction of sampling site A. The total Aroclor 1260 air concentration measured at this site was 0.06 micrograms/m^3 (50 parts-per-trillion), which is at or below PCB levels which have been reported for air in residential areas in highly industrialized areas. Because of the problems with windblown dust, the procedure was changed early in the removal operation and water was applied to the road surface residue prior to sweeping. Observable dust levels were considerably diminished, and subsequent measurements (at sites C and D) were substantially lower. It should be noted, however, that the downwind sample (collected at site D) was the only other sample to show dust levels higher than vapor levels.

Weather data for the three sampling dates were not recorded. However, the weather was apparently similar to that recorded at the Raleigh-Durham Weather Station on those dates. High temperatures were 25 to 27° on each day and lows were 16°C on October 4 and 5 and 9°C on October 12. There was no precipitation during the daylight

hours on any of these days. However, heavy rains occurred during the night on October 4-5 and heavy fog prevailed the test site early in the morning of October 5. by the time digging was begun at about 10:00 a.m., there was high haze and the ground appeared to be damp (but not damp enough to prevent blowing dust).

Wetting of the road shoulder before digging was apparently effective in keeping dust levels down during dumping of the trucks at the temporary storage site. No significant enhancement of particulate-bound PCB was detected at sites E or F, and little if any increase in total airborne PCB was measured within two meters downwind of the dumping.

Vertical profile measurements were taken at one site along the test removal route one day before, one week after and one month after the removal. Portable low volume air samplers were used for this purpose and only vapors were sampled for a period of 4 hour. Air was sampled at several levels directly above the spill on the road shoulder between sites C and D. Data are presented in Table 5.

The presence of PCBs in the air was not found to exceed the NIOSH proposed criterion for workplace air of 1 microgram/m^3, even directly above spill sites. There was no significant increase in ambient air concentrations of Aroclor 1260 during test removal operations performed along NC 58 in Warren County, North Carolina.

Table 5

Vertical Profile of Aroclor 1260 Air Concentrations Directly Over Treated Spill on NC 58 Test Site (Warren Co.)

Distance above spill (cm)	Air Concentration micrograms/m^3 Before removal	One week After removal	One month After removal
2	0.90	0.05	0.14
30	0.09	-	0.05
60	0.02	0.14	0.01
120	0.01	-	0.05
180	0.01	0.01	0.03

TABLE 4

AIRBORNE AROCLOR 1260 CONCENTRATIONS IN $\mu g/m^3$ OF AIR NEAR TEST REMOVAL SITE IN WARREN COUNTY, NORTH CAROLINA[a]

AIRBORNE STATE	SITE A[b] (TOBACCO FIELD, WEST SIDE)			SITE B (TOBACCO FIELD, EAST SIDE)			SITE C (THORNE GARDEN, EAST SIDE)		
	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER
DUST	–	0.038	0.002	–	0.001	0.003	0.005	0.001	0.002
VAPOR	–	0.026	0.008	–	0.010	0.010	0.017	0.006	0.006
TOTAL	–	0.064	0.010	–	0.011	0.013	0.022	0.007	0.008

AIRBORNE STATE	SITE D[b] (THORNE LANE, EAST SIDE)			SITE E[b] (DUMP SITE, FAR SIDE)			SITE F (DUMP SITE, NEAR SIDE)		
	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER	BEFORE	DURING	AFTER
DUST	0.002	0.012	0.001	0.010	0.009	0.001	0.002	0.005	0.001
VAPOR	0.012	0.011	0.005	0.014	0.025	0.011	0.009	0.009	0.006
TOTAL	0.014	0.023	0.006	0.024	0.034	0.012	0.011	0.014	0.007

[a]DATES OF SAMPLING: BEFORE 10/04/78; DURING 10/05/78; AFTER 10/12/78.

[b]DOWNWIND DURING DIG.

b. Indoor Air Monitoring

The air was sampled for the presence of PCBs inside seven houses or other structures along the test removal route on NC 58 near Inez in Warren County. Sampling was performed before, during and after removal operations.

The seven sites monitored in connection with the Warren County test removal are shown in Figure 9. Air was sampled inside six of the structures on September 19 and inside the remaining one on October 4, 1978, one day prior to the dig. Due to a late and unexpected change in plans, however, the dig route was terminated outside the community of Inez (see Figure 9), so that most of the buildings were not in the immediate vicinity of removal operations. Consequently, samples were not collected at sites 1, 2, 4 and 5 during or after the dig. Indoor air levels of Aroclor 1260 are given in Table 6. All were substantially below the NIOSH proposed criterion of 1 microgram/m^3. There was no evidence of increased air levels in any of the structures monitored during the digging operations.

All air monitoring data taken inside domiciles and other buildings located along roadways on which PCB spills occurred showed no level above 0.10 micrograms/m^3. This level is one-tenth that of the proposed NIOSH criterion for workplace air.

Table 6

Indoor Air Levels of Aroclor 1260 in Buildings Along Test Removal Route

Location	Air concentration (micrograms/m^3) Before	During	After
Thompson Grocery	0.10	-	-
Thompson House	0.02	-	-
Inez Country Store	0.01	0.01	<0.01
Thorne House	<0.01	-	-
Thorne Barn	<0.01	-	-
Fleming House	0.10	<0.01	<0.01
Chicken Coop	0.01	<0.01	<0.01

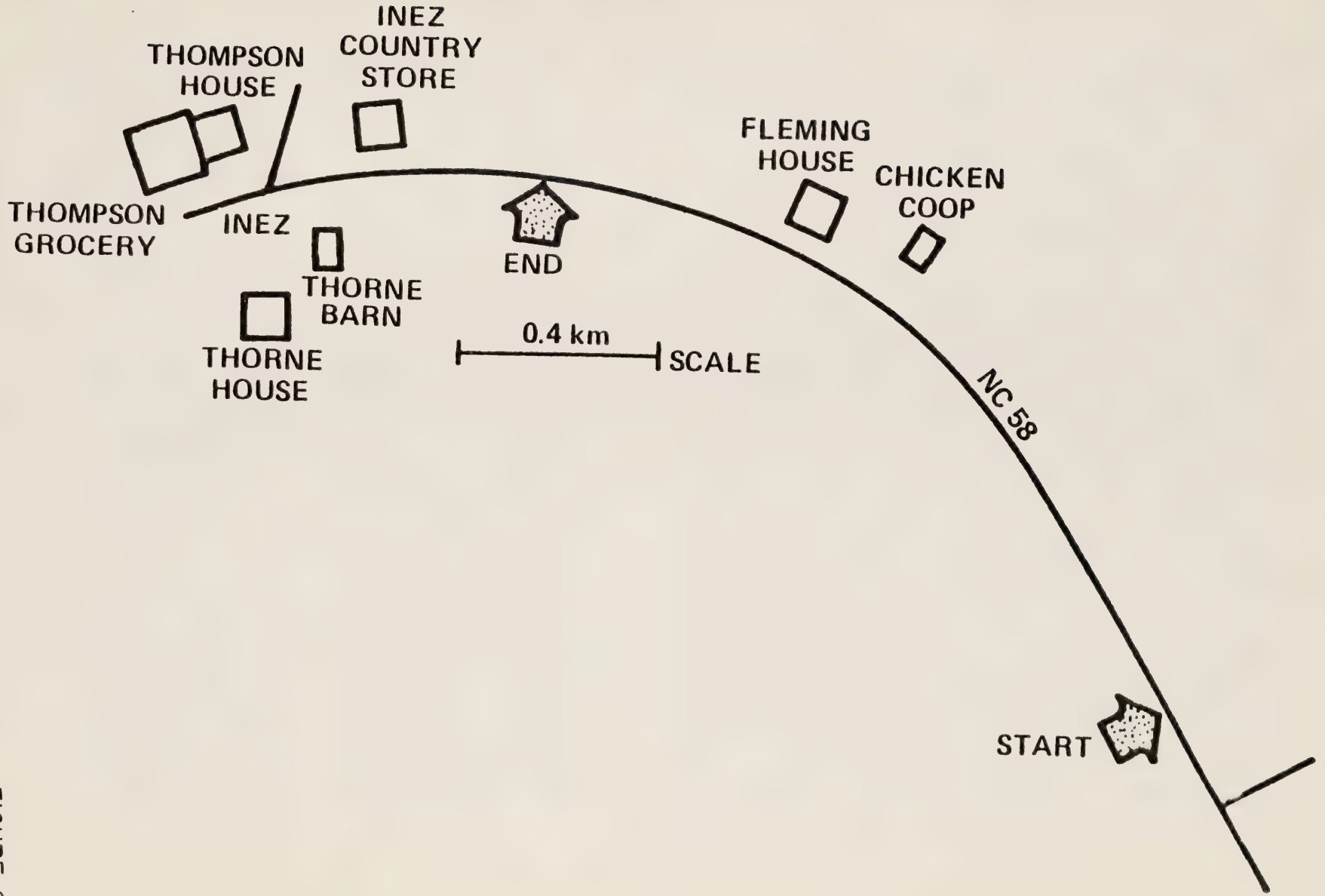

INEZ
COUNTRY
STORE
THOMPSON
HOUSE
FLEMING
HOUSE
CHICKEN
COOP
THOMPSON
GROCERY
INEZ
END
THORNE
BARN
THORNE
HOUSE
0.4 km
SCALE
NC 58
START

FIGURE 9

2. Water Quality

A short-term water quality impact will occur as a result of leaving particles of soil contaminated with PCBs on the surface of the highway after removal. This soil, which is not returned to the shoulder and incorporated into the soil column, will migrate to streams during rainfall events which carries the soil particles into drainage channels, ditches, and streams. Wind could pick up the soil particles as dust and create some migration of particles into adjacent fields. Test results of the test pickup suggest that concentration of PCBs contained in the soil remaining in cracks and crevices of the pavement surface would be insignificant when compared to the volume and concentration of the material being removed from the shoulder. Test results of the wash water utilized in the clean up operation indicate that there is an extremely weak concentration of PCB in solution that will be readily absorbed by the soil along the roadside. Some contaminated pockets will remain adjacent to the pavement and with the excavated portion of the shoulder which could migrate into the environment through soil erosion. This amount of PCB material is insignificant when compared to the volume and concentration of the material removed from the shoulder. The entire pickup operation will be monitored to insure that the volume of the contaminated soil residual is minimized.

3. Plant and Animal Life

The PCB contaminated soil is currently available to be ingested by animals which may be present on the contaminated roadside. Removal of the soil from the roadside and its disposition in the proposed landfill will substantially diminish its availability to plant and non-human animal life. At the landfill site the contaminated soil will have no exposures to plants and non-human animal life due to the fact that it will be totally encased in a plastic lining and will be covered by 1.5 feet of soil. In addition the entire landfill will be enclosed inside a chain link fence.

In so much as the actual soil removal operation simulates the normal Department of Transportation maintenance work along the roadways, no adverse effect on the plant or non-human animal life is expected to result from the excavation and grading. The excavated area will be back-filled with soil pulled from the ditch area or trucked in from a non-contaminated area. The area will be reseeded; therefore, this represents only a temporary disruption of the plant life along these roadways.

The other possible risk that must be considered is that of displacement of PCB contaminated soil to the adjacent area during the removal operation. Previous laboratory testing by the North Carolina Department of Agriculture found PCB on plant foliage up to several hundred yards along these roadways. This atmospheric translocation is presumed to be via PCB laden dust or aerosol spray. The areas under consideration are all in rural areas and therefore the possible contamination of home gardens and agricultural field crops must be considered. With adequate dust controls as demonstrated during the removal operations in Warren County, there would be no significant contamination of crops. The levels of PCB expected to be found on such crops would not preclude the usage of these crops.

4. Traffic Disruption

It is not anticipated that the removal and hauling operations will create any major traffic disruption. The PCB spills are predominately along rural routes with relatively low traffic counts. The removal operation will be quite similar to shoulder and ditch maintenance operations routinely carried out by state forces. Accordingly, these personnel have a great deal of experience in the handling of traffic under these conditions.

One way traffic will be maintained throughout the removal sites. Advance warning signs in accordance with the Manual Uniform Traffic Control Devices and flagmen will be employed. Emergency vehicles will be given immediate ingress and egress through the areas and local school officials will be kept posted as to the location of current work areas.

Haul trucks will be dispatched from the removal area at approximate 5 minute intervals providing adequate passing distance for following motorists. The haul routes will also be routinely monitored by vehicles equipped with mobile radios in order that traffic disruptions that may be caused by mechanical failure may be promptly alleviated.

B. Disposal Method

1. Air Quality

The air quality measurements taken before, during and after the test removal of PCB contaminated soil from the roadway shoulder were not found to exceed the NIOSH criterion for workplace air of 1 microgram per cubic meter. Wetting of the road shoulder was apparently effective in keeping dust levels down during dumping of the trucks at the temporary storage site. No significant enhancement of particulate-bound PCB was detected at the dumping sites and little if any increase in total airborne PCB was measured within two meters downwind of the dumping. The placement of PCB contaminated soils in the disposal area will be under similar conditions and within an excavated pit; therefore, the potential for airborne migration of particulate-bound PCB will be further reduced. Designed close-out procedures will preclude airborne contamination after site closure.

A gas vent will be installed in the disposal pit to allow venting of gases generated by decomposing grass contained in the disposed materials. Since all external sources of moisture will be excluded from the disposal area, moisture will be limiting for any decomposition process and gas generation will be minimal. PCB and more particularly carbon-absorbed PCB is not volatile and will not generate gaseous products. Disposal operations will not present an unreasonable risk or injury to public health and environment through airborne particulate-bound PCB or gas migration.

2. Water Quality-Hydrology

Water quality on the site will be protected by multiple liners, leachate collection systems, and erosion control measures and devices.

Surficial soils on the disposal site have a high clay and silt content. Studies conducted by the state and a soils engineering firm indicate that the soils meet or exceed requirements of 40 C.F.R. 761.41 Annex II as amended. Copies of the laboratory test report are included in Appendix B of this statement. Nineteen soils borings of the disposal area were made and continuous samples were obtained. Samples were analyzed in the laboratory to determine classification, compaction and permeability characteristics. The EPA soil requirements and test results of the samples taken are listed below.

Requirement Liner Materials	State Study Liner Material	Soil & Material Eng. Study Liner Material
In place soil thickness of 4' or 3' compacted soil liner	Sufficient materials for a 5' compacted liner	More than 50,000 cubic yds. available to construct 5' compacted liner
Permeability 1.0×10^{-7} cm/sec	$2.1 - 2.4 \times 10^{-8}$ cm/sec	5.8 to 1.8×10^{-8} cm/sec
Percent soil passing #200 sieve ≥ 30	Average 65%	59 - 88 Percent
Liquid limit ≥ 30	Average 50	36 - 71
Plasticity index ≥ 15	Average 18	9 - 21

Artificial liners and liners constructed from these soil materials will be engineered to prevent infiltration and exfiltration from the site. The sequence consisting of surface erosion control measures and structures, compacted earth surface liner, 10 mil artificial liner, upper leachate collection system. 30 mil artificial, 5' compacted clay liner, lower leachate collection and removal system and, a minimum 5' separation from the highest predicted groundwater fluctuation will prevent impact on ground or surface waters. There will be no hydraulic connection between the PCB contaminated soil and surface or groundwater.

Any leachate generated will be withdrawn by the leachate collection and removal system on as frequent a schedule as necessary with monthly monitoring as a minimum frequency. Surface waters will be protected by sedimentation basins during disposal operations and any PCB contaminated sediment will be returned to the disposal area prior to closure.

After site closeout the leachate collection systems will be monitored monthly and receiving surface waters biannually. The site will be monitored as long as required by EPA regulations.

If any system failure occurs all necessary appropriate action for correction will be taken by the State of North Carolina.

The disposal design provides stringent environmental isolation of the PCB contaminated soil and does not present an unreasonable risk of injury to public health and the environment.

3. Plant and Animal Life

To assess the effect at the disposal site, both the short and long range factors were considered. The short range effect, if any, would be due to translocation from the disposal site primarily by PCB dust and soil particles. Any short range effect would be the same or similar to those expected along the clean-up routes except those possible effects on vegetable and field crops. No such agricultural crops will be within the expected impact area.

The disposal site will be constructed, filled, closed, and maintained as detailed elsewhere in this report. There are no expected long range adverse effects on the plant or animal life at or near the disposal site.

C. Land Use

The proposed disposal site is located within the Region K, Kerr-Tar Regional Council of Governments. A Land Use Plan for Region K was prepared in January of 1978. The existing land uses in the vicinity of the project are classified as rural areas. The rural areas are comprised of forest, agricultural land, residential land and to a lesser extent industrial land.

D. Cultural Resources

The North Carolina Department of Cultural Resources, Division of Archives and History has reviewed the disposal site for potential effects on cultural resources. There are no structures in the disposal area of architectural importance. The disposal site was also reviewed for potential effects on archaeological resources. It was concluded that there is little likelihood that any archaeological resources will be affected by the proposed disposal site.

E. Effect On Workers, Motorists and Area Residents

Based on the NIOSH (National Institute of Occupational Safety and Health) standard of 1 microgram/m^3 of PCB in air, there is no reason to believe that temporary exposure, if any, would create a health hazard to motorists who may drive past a clean-up operation or to any resident who lives along a spill route. The NIOSH standard is based on the expected working life of an employee, i.e. forty hours per week during a lifetime. Within this time frame, any exposure a motorist or area resident would experience would be insignificant.

While no adverse effect is expected among the personnel involved in clean-up operations, personal protective wear will be furnished those workers directly involved with the removal and disposal operation.

In summary, no adverse effect on the workers, motorists, or persons living along the spill sites is expected.

IV. SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed removal and disposal of the PCB contaminated soil from the roadway shoulder will have some adverse effects on the environment. The most significant effect will be the taking of approximately five acres of land out of agricultural production for an indefinite period of time. The remaining 137 acres will be utilized as a buffer zone for the disposal pit. A portion or all of the land used as a buffer area may be leased by the State for agricultural or other compatible land uses. The disposal of the PCB contaminated soil at the Warren County site will restrict land use within the fenced area of the proposed disposal site.

V. STEPS TAKEN TO MINIMIZED HARM OF UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Although approximately 142 acres of land will be purchased by the State for construction and protection of a disposal site to contain the PCB contaminated soil, only approximately five acres will be removed from production. The remaining acreage will remain suitable for farming purposes. The disposal site will be monitored as indicated previously in this statement.

The design and construction of the disposal pit will be done according to the procedures and EPA regulations outlined in this statement. Every effort will be made to remove, transport and dispose of the PCB contaminated soil in a safe and efficient manner as possible to protect the natural and human environment from further exposure to the PCB substance present in the soil.

VI. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The immediate short-term effects on plant and non-human animal life are restricted mainly to those animals which may ingest the PCB contaminated soil or vegetation present along the roadway shoulders. During the removal of the PCB contaminated soil from the roadway shoulder minor amounts of soil in the form of dust particles could be translocated to adjacent home gardens and agricultural field crops. However, the use of dust control procedures will help to prevent any significant contamination of these areas.

Utilization of approximately five acres of agricultural land for the disposal site will result in a permanent loss of this farmland. Upon removal of the PCB contaminated soil, backfilling and seeding of the roadway shoulder activities involving maintenance, installation of utility lines and driveway pipes will be permitted along the 211 shoulder miles of roadway.

In summary the short-term effects involving the removal and disposal of the PCB contaminated soil is not expected to create conditions that will drastically alter the long-term productivity of the surrounding plant life and non-human animal life. The proposed action will contribute to the long-term economic benefit of present and future residents who are located adjacent to the roadway shoulders.

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES WHICH WILL BE INVOLVED IN THE PROPOSED ACTION

Approximately five acres of agricultural land will be indefinitely committed to containment of the roadway soil contaminated with PCB industrial waste material. Removal and disposal of the PCB contaminated soil will involve a substantial commitment of resources including financial expenditures for labor and materials. Although the labor required to perform the proposed action is an irretrievable resource benefits in the form of returning the roadway shoulders to normal usage and removal of a potentially hazardous industrial waste material from the roadside will justify usage of the necessary labor and financial resources.

VIII. COMMENTS RECEIVED ON THE DRAFT STATEMENT AND RESPONSES

The Draft Environmental Impact Statement was circulated and written comments were received from the Kerr-Tar Regional Council of Governments and Sierra Club - Joseph LeConte Chapter. Their comments on the Draft Statement have been considered in preparing the Final Environmental Impact Statement. Their comments and our responses follow.

A. Kerr-Tar Regional Council of Governments

1. Comment:

Additional emphasis needs to be placed on the integrity of the plastic liner.

a. There is no proposal to maintain the surface free of trees whose roots could penetrate the plastic top liner and create a connection to surface water. Annual mowing should be a minimum requirement.

b. The plastic liners along the side walls of the proposed site offer the only barrier between the disposed PCB waste and the surrounding soil. What other measures does the State propose in order to mitigate any damage of or decomposition of the plastic liner. (root intrusion, damage by equipment, etc.)?

Response: (a) The United States Department of Agriculture, Soil Conservation Service was contacted for their recommended procedures to establish, support and maintain a vegetative cover on the PCB waste landfill site. Their recommendations are included in Appendix E. Their procedures and specifications for a vegetative cover will be incorporated into the design of the PCB waste landfill.

(b) The proposed conceptual design for the PCB landfill disposal site has been revised to provide greater protection to the artificial liner. The final EIS contains a revised conceptual plan for constructing the landfill, see page 11. The revised plan provides a layer of material beneath and above the artificial liner to protect it during construction of the landfill and placement of the PCB contaminated soil. A qualified design consultant will be contracted to prepare plans and specifications for construction of the PCB landfill disposal site.

2. Comment:

Half the waste is to be buried above current ground level and thus be subject to eventual erosion or slump. The Statement mentions flood diversion structures but does not describe them or indicate how long they might be expected to last.

Response: The purpose of the holding pond is to divert surface runoff from the disposal pit area during construction. The PCB disposal site is located above the 100 year flood plain. After the PCB landfill operation is completed no flood diversion structures are planned. Surface run-on at the site will be diverted by grading the vegetative cover for the PCB landfill to topographical lows along the perimeter of the landfill site.

3. Comment:

The proximity of the water table and the bottom of the sump is too close. This is of utmost concern since the exact elevation of the water table has not been determined, only estimated.

Response: Subsurface investigations through borings and the study of hydrographs of wells in the vicinity of the disposal site have given reasonable indication of expected high ground water elevations. The proposed separation of 14 feet between the waste material containing PCB's and the high ground water elevation is within EPA regulations. Maximum separation between the waste material and ground water levels will be given careful consideration during the design of the PCB landfill site.

4. Comment:

The plan allows numerous opportunities for human errors in construction: installing plastic liners and pipes, compacting the clay liner, driving trucks on top of buried pipes and close to plastic side liners, and close tolerance surface grading.

Response: The proposed conceptual plan for the PCB landfill has been revised in the final EIS, see page 11. The revised plan provides greater protection to the artificial liner and leachate collection system. As stated in response to question 1 a qualified consultant will be contracted to design, prepare construction plans and specifications and to see that the PCB landfill is built in accordance with those plans and specifications.

5. Comment:

The site must not be subject to flooding or have a hydrologic connection with the groundwater according to p. 16 of the Draft EIS "Surface water discharge is to

Richneck Creek . . . 40 miles separate the site discharge area and the closest raw water intake." If a disruption were to occur, the PCB material would easily run off into Richneck Creek, and subsequently to the raw water intake located 40 miles downstream. How will the State prevent this from ever occurring?

Response: Every reasonable precaution is being taken in the design of the PCB landfill to prevent discharge to ground or surface water.

6. Comment:

This is not an adequate environmental statement. More emphasis has been placed on the chronology of events which have occurred and little or no mention has been made concerning the possible effects which the proposed PCB landfill could have on the natural environment. Also, by not exploring all possible environmental effects, the means to mitigate or eliminate factors which could do harm to the environment have been omitted.

Response: The environmental impacts of the proposed action are discussed in sections III, IV, V and VI of the EIS. The impact of the proposed action on the air quality, water quality, plant life, animal life, and potential effects on workers, motorist and area residents have been identified and discussed in the EIS.

7. Comment:

Humans should also be considered in ascertaining possible environmental effects posed by the PCB disposal activity. Will PCB disposal affect the economy of Warren County through adverse connotations?

Response: Sections IV, V, VI, and VII of the EIS indicated that the net economic impact of the pick up and disposal will be positive for Warren County due to the ability to utilize the presently contaminated shoulders. The landfill will have absolutely no impact on land use outside of the State-owned property; and therefore the economy of Warren County will not be affected. This conclusion is supported by the fact that a major poultry processing plant has recently decided to locate in Warren County with full knowledge of the PCB disposal plan.

8. Comment:

Reputable sources have disputed the State findings on the availability of clayey material, further investigation should be made.

Response: The procedures used in the selecting potential disposal sites required that the land area and subsurface soils met EPA landfill technical requirements. The soils at the Warren County site have been evaluated by State agencies and by a soils engineering firm on different occasions. The North Carolina Department of Transportation, Division of Highways, Geotechnical Unit and Department of Human Resources, Environmental Engineers conducted in-place soil evaluations on September 18, 1978 and on December 6, 1978. A soils engineering firm, Soil and Material Engineers Inc., performed an investigation and evaluation of soil conditions at the Warren County site in February and June of 1979. These soil evaluations and laboratory test results are in included in Appendix B of the EIS. The soil borings and laboratory tests indicated that most of the clayey material is found in the soil surface to a depth of 4 feet or more. The tests indicated that the material when compacted to 95% standard proctor met or exceeded permeability requirements.

9. Comment:

The express will of the local government concerning PCB disposal should be given more consideration by the State government.

Response: The comments and views of the local governments have been given careful attention. The EIS incorporates many of the suggestions of the local governments.

10. Comment:

Warren County hired a geologist, Dr. Charles L. Mulchi, who took his own soil samples at the site and reviewed the State's plan. The Environmental Impact Statement does not mention him or the questions he raised about clay type, depth of clay, and groundwater uncertainties. The addition of the 30 mil plastic liner may have been in part a response to his criticism about lack of groundwater protection from leachate. He recommended that the State's proposal be turned down and his paper, A Review of the Proposal to Use Soils in the Afton Community of Warren County, N. C. as a Disposal Site for SoilsContaminated with PCB, still remains valid for the most part.

Response: Dr. Charles L. Mulchi's questions about clay type, depth of clay and ground water levels have been addressed in sections I and II of the environmental impact statement. The investigation and evaluation of soil conditions at the Warren County site were conducted by the State and by a soils engineering firm. Their in-

dependent analysis of the in-place soil conditions concluded the proposed site can meet EPA technical requirements for construction of a PCB waste landfill.

B. Sierra Club - Joseph LeConte Chapter

1. Comment:

Citizens Monitoring Committee

A committee of local citizens must be formed to monitor the construction, operation and long term management of the facility. Members of the committee must include local officials, adjacent land owners, and leaders of the community including those who may be opposed to the proposed action. This will allow the affected community to keep close watch on all activities concerning this project. It must be in attendance during all activities, especially the monitoring after closure of the landfill.

Response: The PCB landfill will be designed by a qualified consulting firm. The consultant will monitor the construction process and perform necessary quality control testing to assure that the landfill is built according to plans and specifications. The North Carolina Department of Human Resources will also provide personnel to monitor and inspect the construction of the landfill.

2. Comment:

Disclosure

All operations and monitoring data must be announced to the local and statewide news media on a regular and continuing basis. This will keep the public informed of the current status whether good or bad and will provide accountability of the responsible state officials.

Response: Data resulting from the testing of soils at the site and water monitoring data will be documented and kept on file. This information will be made available to the news media and the public upon request.

3. Comment:

Leachate Treatment

Treatment of leachate has been discussed in the DEIS. However, no method of disposal of the treatment residue of leachate after landfill closure has been described. An approved EPA method of disposal must be provided for this residue.

The decontaminated effluent of the leachate must be tested before it is discharged. This effluent must not be released until laboratory analysis has confirmed that the PCB's have been removed. The DEIS must describe the manner in which the effluent will be discharged.

Response: The Final EIS has been revised to reflect this comment, see page 14.

4. Comment:

All possible legal and administrative actions must be taken to insure the one time use of this site for the disposal of the PCB contaminated soil as described in the DEIS. The affected community needs every guarantee that the proposed action is the only use ever for the site.

Response: The environmental impact statement addresses the removal of approximately 40,000 cubic yards of PCB laced soil located along approximately 210 miles of roadway shoulder and the disposal of the soil at a selected site in Warren County. The State has no future plans to use the PCB landfill site in Warren County for disposal of additional PCB material and/or other hazardous waste. The present administration has no authority to bind future administration to restricted use of this property as a one time hazardous waste disposal site.

5. Comment:

The proposed five (5) foot groundwater separation is insufficient. Information in the DEIS shows that a much greater separation is possible.

Page 17, paragraph 1 gives the maximum excavation depth as 24 feet. Thus, by removing the thickness of the liner and leachate collection systems, the landfill will have a useable depth of 17 feet. Allowing for topographic variation, a useable depth of 15 feet would mean that the entire 40,000 cubic yards of contaminated material could be stored in an area of 1.7 acres.

By increasing the landfill surface area to 2.9 acres (as is shown in the N. C. Department of Transportation boring (soils) study in the DEIS), the maximum excavation depth would only be 14 feet - 10 feet shallower than proposed in the DEIS. This increase in area will increase the groundwater separation to 15 feet - more than double the proposed separation.

In the interest of maintaining environmental protection, the final design for the landfill must provide greater groundwater separation than proposed. This can be achieved at little or no increased cost and will provide a greater measure of security.

Response: EPA regulations require a minimum of 10' separation between the PCB contaminated soil and the seasonal high groundwater table. The predicted maximum groundwater table is 312 feet or 32 feet below existing land surface. The proposed PCB landfill design allows

a separation of 14 feet from the PCB contaminated soil and the predicted maximum groundwater table. A decrease in excavation depth will increase the ground surface area of the landfill that is exposed to natural environmental weathering conditions. The proposed landfill design seeks a balance between separation of groundwater and ground surface exposure to minimize environmental impacts.

6. Comment:

According to Figure 5, Section I. D., the landfill will not have a contiguous clay liner; the design fails to provide a uniform container of equal specifications for the bottom, sides and top. The DEIS provides no information to show that latterally moving groundwater or that animals will not be a problem. In addition, there is no information about the long term integrity of the artificial liner.

The entire landfill must be encased in a clay liner that is contiguous from the cap to the bottom including the sidewalks. This contiguous liner must be constructed to the specifications that are proposed for the bottom in the DEIS.

Response: The proposed conceptual design of the PCB waste landfill has been revised to reflect the above comment, see page 11.

7. Comment:

The proposed cap design is insufficient to provide for vegetal erosion control and to prevent future penetration by surface water. The specifications on page 12 (10 mil artificial liner, 1.5 foot clay liner and 6 inches of topsoil graded to a 2% slope) fail to provide an adequate root zone for maintaining vegetation without an irrigation system. Any vegetation established in such a thin zone for roots will be very susceptable to drought. Site maintenance must include fertilization and reseeding of the vegetal cover.

Moreover, the cap is not thick enough to allow for pedogenetic (soil forming) processes. The design provides for an almost inpenetrable bottom; it must provide a no less penetrable cap. The chemical and physical forces that could penetrate the landfill are most intense at the ground surface. It is conceivable that normal climatic events could easily penetrate the 2 feet of topsoil and clay liner within a century. This scenario is made more probable if a small area of vegetation dies and erosion occurs.

The cap design must specify 2 feet of root zone consistant with agronomic concepts and the same clay

liner plus artificial liner requirements as proposed for the bottom in the DEIS. An agronomist-soil scientist must supervise all surficial earth disturbances, vegetation and cap construction.

Response: The United States Department of Agriculture, Soil Conservation Service was contacted for their recommended procedures to establish, support and maintain a vegetative cover on the PCB waste landfill site. Their recommendations are included in Appendix E. Their procedures and specifications for a vegetative cover will be incorporated into the design of the PCB waste landfill.

8. Comment:

Revised Draft Environmental Impact Statement

We request that a revised DEIS be prepared which incorporates our recommendations. This revised document will allow all agencies and the public to assess submitted comments on the proposed action.

Response: The final environmental impact statement contains responses to the comments received on the draft statement, see section VIII, of this statement. Those recommendations that were considered reasonable and feasible to implement have been incorporated into the Final EIS. Comments received on the Draft EIS are included in Appendix D of this statement.

TLW/FV/dk

APPENDIX A
PCB Spill Site Locations
and
Soil Sampling Results

SPILL SITE No. 1

LOCATIONS:

1. SR 1004, Alamance County-From Bethel Church North of Snow Camp to the Chatham County Line. Length: 5.00 shoulder miles.

2. SR 1004, Chatham County-From Alamance County Line to SR 1346. Length: 2.22 shoulder miles.

3. SR 1346, Chatham County-From intersection with SR 1004 to NC 87. Length: 11.16 shoulder miles.

4. NC 87, Chatham County-From intersection with SR 1346 Southerly. Length: approximately 1.42 shoulder miles.

Location of Sampling Sites within Spill Site No. 1

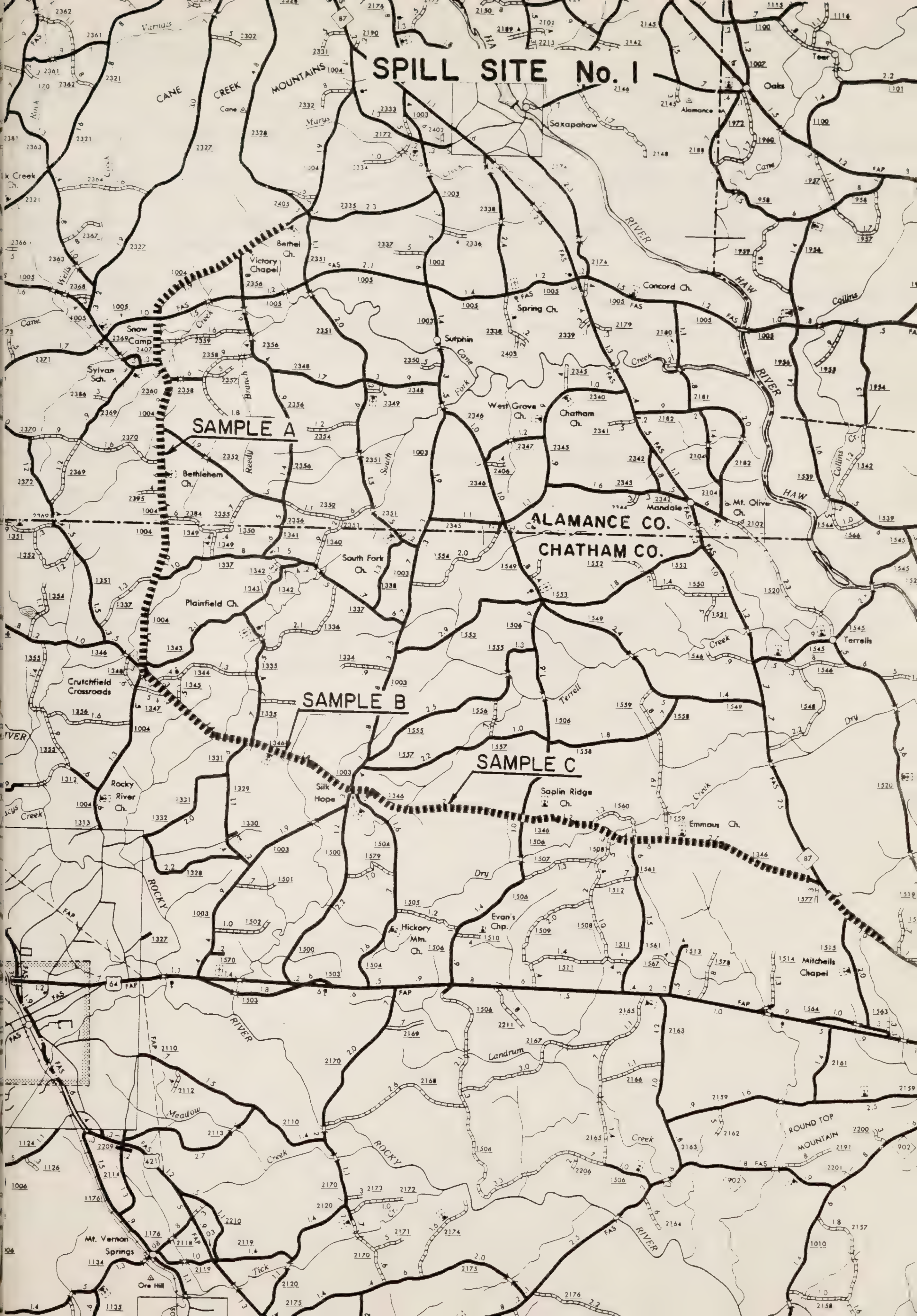
A. SR 1004, .15 mile South of SR 2352 pole #5463 SPC 75

B. SR 1346, 0.5 mile East of SR 1335 in front of pole #7486

C. SR 1346, 51 yards West of Leroy Gowen mailbox-1 mile West of SR 1506

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	20	140	2100
1-3 Inches	1.9	4.1	130
3-6 Inches	32	1	35



SPILL SITE No. I
SAMPLE A
SAMPLE B
SAMPLE C
ALAMANCE CO.
CHATHAM CO.
CANE CREEK MOUNTAINS
Saxapahaw
Oaks
Teer
Snow Camp
Sylvan Sch.
Victory Chapel
Bethel Ch.
Bethlehem Ch.
Sutphin
Spring Ch.
Concord Ch.
West Grove Ch.
Chatham Ch.
Mandale
Mt. Olive Ch.
South Fork Ch.
Plainfield Ch.
Crutchfield Crossroads
Silk Hope
Rocky River Ch.
Saplin Ridge Ch.
Emmaus Ch.
Terrells
Hickory Mtn. Ch.
Evan's Chp.
Mitchells Chapel
ROUND TOP MOUNTAIN
Mt. Vernon Springs
Ore Hill
HAW RIVER
ROCKY RIVER

SPILL SITE No. 2

LOCATIONS:

1. US 421, Chatham County-SR 2126 to Lee County Line. Length: 9.59 shoulder miles.

2. SR 1006, Chatham County-Between NC 902 and NC 42. Length: 3.46 shoulder miles.

3. NC 42, Chatham County-From Deep River (Lee County Line) to intersection with SR 1006. Length: 4.56 shoulder miles

4. NC 902, Chatham County-From SR 1006 to Rocky River. Length: 9.68 shoulder miles.

5. NC 42, Lee County-From intersection with SR 1322 to Deep River (Chatham County Line). Length: 4.52 shoulder miles.

Location of Sampling Sites within Spill Site No. 2

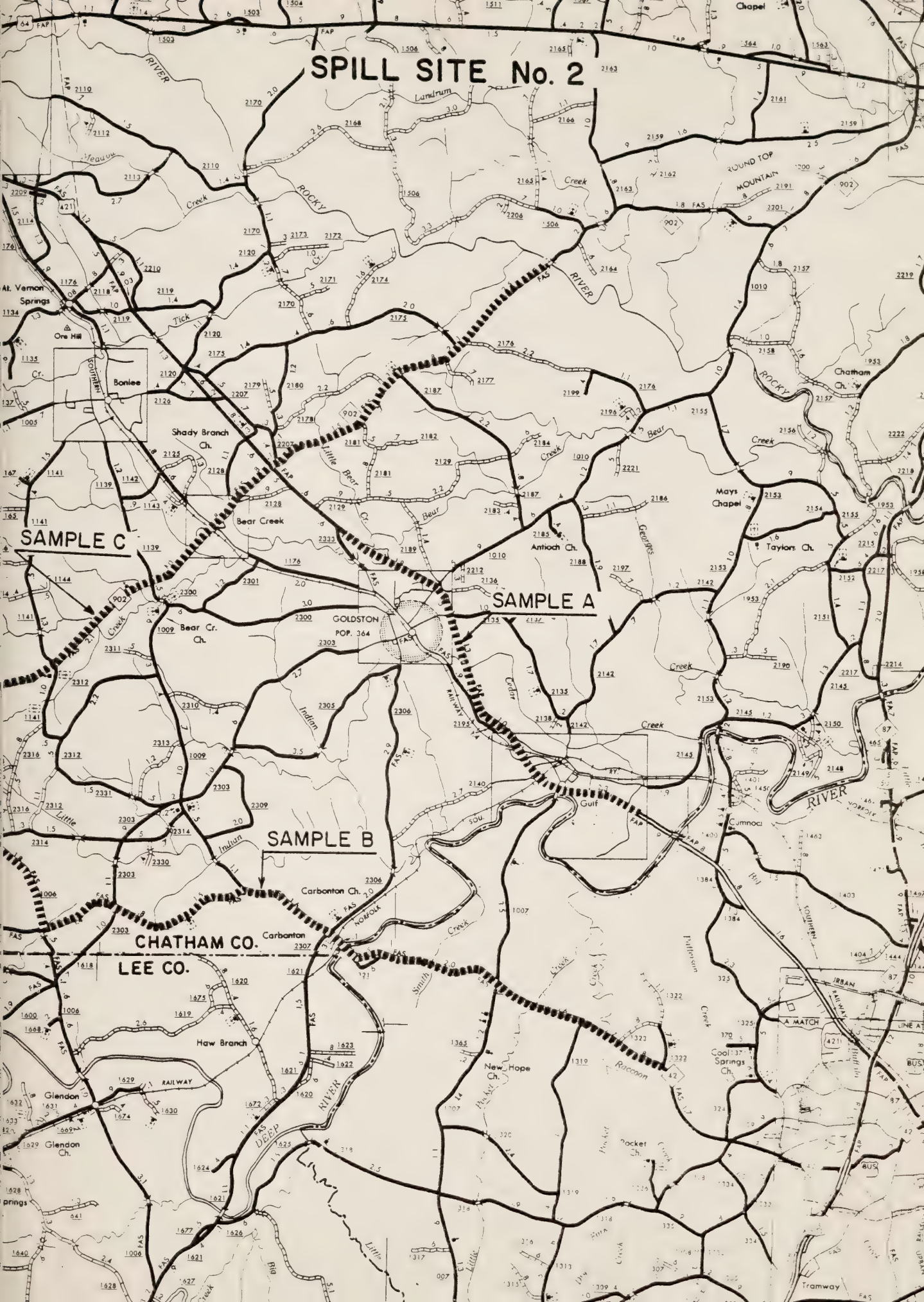
A. US 421, 1.6 mile South of SR 1010 North end of guardrail 3"-6"

B. NC 42, 1.5 miles NW of SR 2306 in front of SE corner of John Vaughn's pond

C. NC 902, 1.0 mile Northeast of SR 1141 directly across from telephone pole #674 SPC 8

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	2.4	1800	480
1-3 Inches	< 1	210	< 1
3-6 Inches	< 1	22	< 1


SPILL SITE No. 2
SAMPLE A
SAMPLE B
SAMPLE C
CHATHAM CO.
LEE CO.
GOLDSTON
POP. 364
Bonlee
Carbonton
Gulf
Cumnock
Glendon
Haw Branch
Shady Branch Ch.
Bear Creek
Bear Cr. Ch.
Antioch Ch.
Mays Chapel
Taylors Ch.
Chatham Ch.
Carbonton Ch.
New Hope Ch.
Cool Springs Ch.
Pocket Ch.
Glendon Ch.
Ore Hill
At. Vernon Springs
ROUND TOP MOUNTAIN
ROCKY
RIVER
Creek
Tick
Little Bear
Bear
Cedar
Indian
Little
Big
Deep
Smith
Raccoon
Pocket
Tramway
SOUTHERN RAILWAY
SEABOARD
NORFOLK
SOU.
FAP
FAS

SPILL SITE No. 3

LOCATIONS:

1. NC 87, Lee County-From Harnett County Line to US 421. Length: 2.14 shoulder miles.

2. NC 87, Harnett County-From Lee County Line to NC 27. Length: 5.30 shoulder miles.

3. NC 27, Harnett County-From NC 87 to SR 1252. Length: 12:00 shoulder miles.

Location of Sampling Sites within Spill Site No. 3

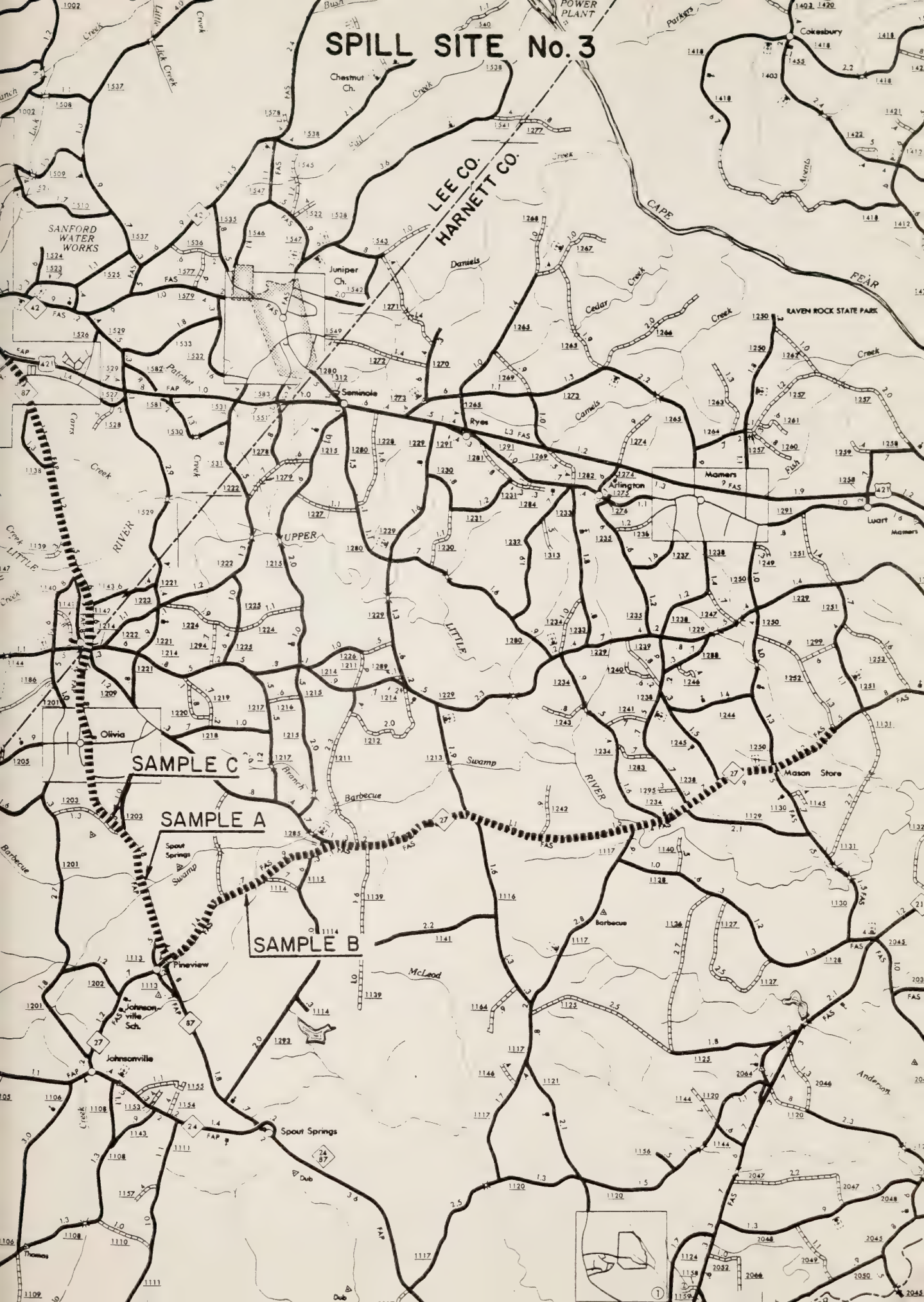
A. On Hwy. 87 approximately 1.1 mile South from junction SR 1203.

B. Hwy. 27 0.3 mile East of SR 1210 at Twin Oaks.

C. Hwy. 87 0.3 mile North of SR 1203 at ulitily acess #28A at pine tree.

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	2400	900	2000
1-3 Inches	110	260	480
3-6 Inches	110	7.6	15


SPILL SITE No. 3
SAMPLE A
SAMPLE B
SAMPLE C
LEE CO.
HARNETT CO.
SANFORD WATER WORKS
Juniper Ch.
Chestnut Ch.
Seminole
Ryes
Arlington
Mamers
Wart
Olivia
Pineview
Johnsonville
Johnsonville Sch.
Spout Springs
Dub
Thomas
Mason Store
Coatesbury
RAVEN ROCK STATE PARK
Daniels
Cedar Creek
Camels
Fish
Parkers
Avents
CAPE FEAR
POWER PLANT
Patchet
Little Creek
Creek
Swamp
Barbecue
McLeod
Anderson
RIVER
LITTLE
UPPER
Branch
FAS
FAP

SPILL SITE No. 4

LOCATIONS:

1. NC 96, Granville County-From just North of Oxford to NC 49. Length: 15.2 shoulder miles.

2. NC 49, Granville County-From NC 96 to Person County Line. Length: 1.80 shoulder miles.

3. NC 49, Person County-From Granville County Line to SR 1515. Length: 4.24 shoulder miles.

Location of Sampling Sites within Spill Site No. 4

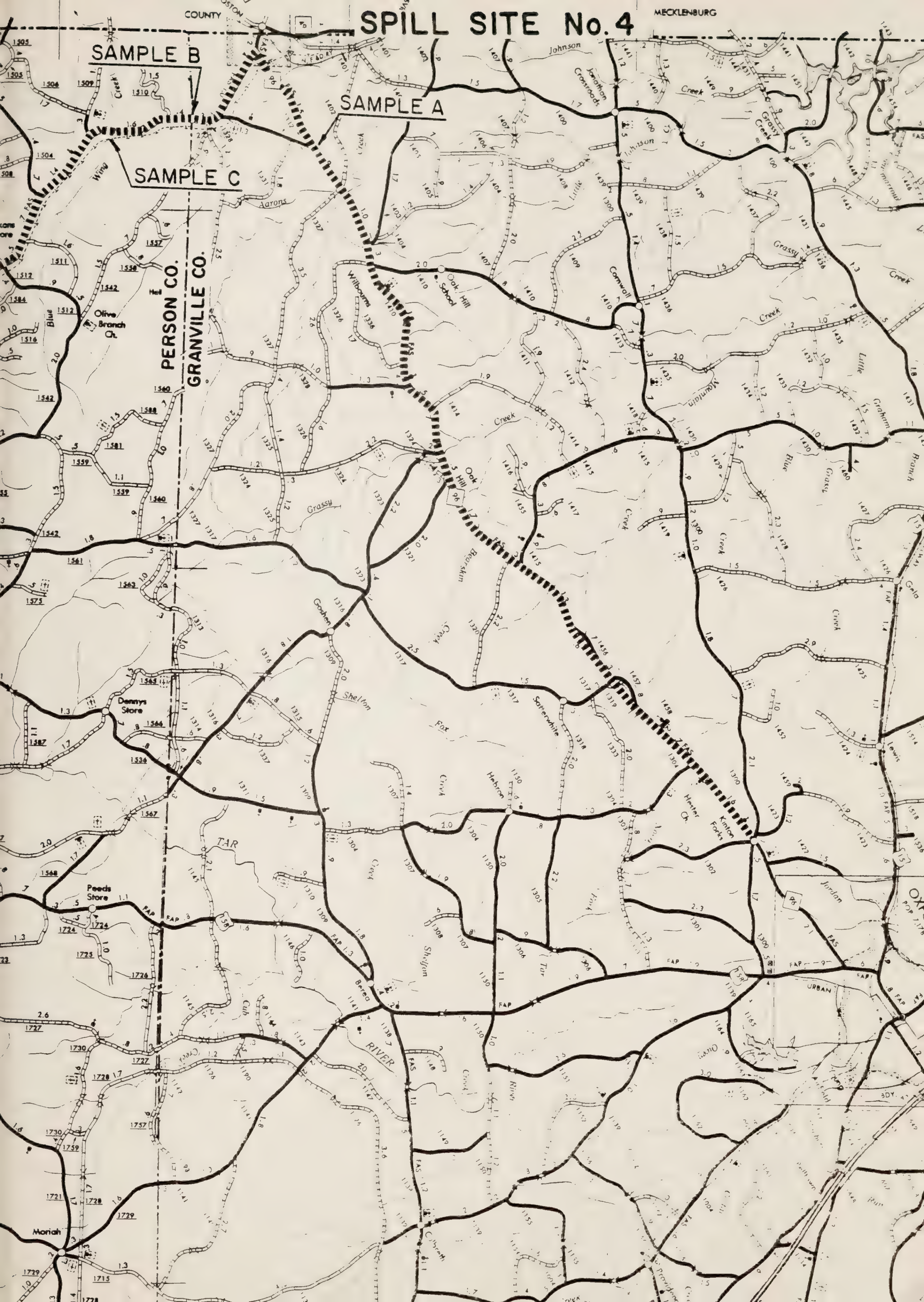
A. 1.6 mile South East of NC 49-Adiacent to Carolina Telephone 3"-6" Exc. Bound

B. 0.4 mile West of SR 1510 Surface

C. 0.5 mile East of SR 1509

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	2600 (1242) 710	69 (1242) 25	6.3 (1242) 2.9
1-3 Inches	11 (1242) 2.1	< 1 (1242) < 1	< 1 (1242) < 1
3-6 Inches	18 (1242) 6.7		< 1 (1242) < 1


SPILL SITE No. 4
COUNTY
MECKLENBURG
SAMPLE A
SAMPLE B
SAMPLE C
PERSON CO.
GRANVILLE CO.
Olive Branch Ch.
Oak Hill School
Oak Hill
Goshen
Dennys Store
Peeds Store
Satterwhite
Hebron
Kinton Forks
Berea
Moriah
Jonathan Crossroads
Cornwall
Lewis
TAR
RIVER
URBAN

SPILL SITE No. 5

LOCATIONS:

1. NC 210, Harnett County-From Johnston County Line to City limits of Angier. Length: 1.82 shoulder miles.

2. NC 210, Johnston County-From intersection with US 70 Southerly to Harnett County Line. North side only. Length: 17.00 shoulder miles.

Location of Sampling Sites within Spill Sites No. 5

A. Junction 210 and NC 50.8 mile Southwest 210 opposite GV Kings Driveway

B. Hwy. 210 0.6 miles of junction with SR 1335 at RH Lassester's Hertford.

C. On Hwy. 210 1. mile Southwest junction SR 1010 Johnson County across Ulility Pole #47 0.1

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	3600	94 (1242) 850	390 (1242) 4100
1-3 Inches	12	3.3 (1242) 30	14 (1242) 55
3-6 Inches	14	< 1 (1242) 6	1.1 (1242) 5.5

SPILL SITE No. 5
SAMPLE C
SAMPLE B
SAMPLE A
JOHNSTON CO.
HARNETT CO.
WAKE CO.
SMITHFIELD

SPILL SITE No. 6

LOCATIONS:

1. US 158, Warren County-Between Macon and Vaughan.
   Length: 0.60 shoulder miles.

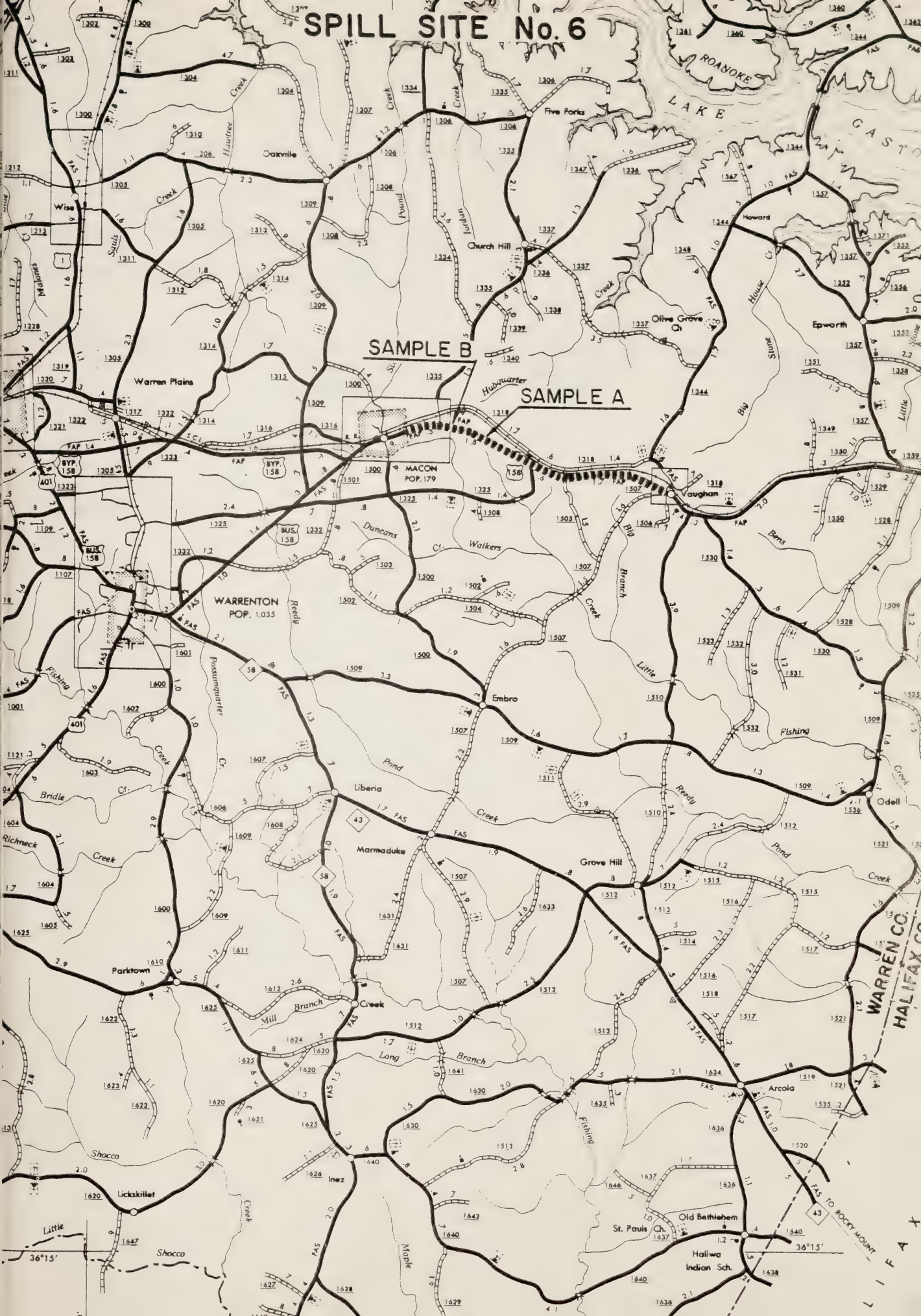
Location of Sampling Sites within Spill Site No. 6

A. NC 158, 1 mile West of SR 1325 Surface

B. NC Hwy. 158 NR Macon.

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B
0-1 Inches	70	190
1-3 Inches	2.0	8
3-6 Inches		< 1


SPILL SITE No. 6
SAMPLE B
SAMPLE A
WARRENTON
POP. 1,035
MACON
POP. 179
Warren Plains
Oakville
Five Forks
Church Hill
Olive Grove Ch.
Epworth
Howard
Vaughan
Embro
Liberia
Marmaduke
Grove Hill
Arcola
Parktown
Lickskillet
Inez
Old Bethlehem
St. Pauls Ch.
Haliwa Indian Sch.
Odell
Wise
Hurricane Creek
Fishing Creek
Reedy Creek
Pond Creek
Shocco Creek
Little Shocco Creek
Maple Creek
Big Branch
Little Branch
Mill Branch
Long Branch
Walkers Cr.
Duncans Cr.
Bridle Cr.
Richneck Creek
Roanoke River
LAKE GASTON
WARREN CO.
HALIFAX CO.
FAS TO ROCKY MOUNT
36°15'

SPILL SITE No. 7

LOCATIONS:

1. NC 44, Edgecombe County-From SR 1409 East 0.2 miles.
   Length: 0.23 shoulder miles.

Location of Sampling Sites within Spill Site No. 7

A. Hwy. 44, .35 mile East of SR 1409

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwies noted.

	SAMPLE A ~~SITE A~~	SAMPLE B ~~SITE B~~	SAMPLE C ~~SITE C~~
0-1 Inches	< 1		
1-3 Inches			
3-6 Inches			


SPILL SITE No. 7
SAMPLE A
ENFIELD
POP. 3,272
HALIFAX CO.
NASH CO.
EDGECOMBE CO.
Heathsville
Beaverdam
Delmar
Ruggles
Eden Met. Ch.
Haywood
Crowells Crossroads
Bricks
Mann
Gethsemane
Red Hill
Draughn
O'Neal
Speight Ch.
LEGGETT
POP. 170
Burnt
Coat
Jacket
Swamp
Beech
White Oak
Swift Creek
Maple
Fishing
Lane
Seaboard
Coast
Conoconnara

SPILL SITE No. 8

LOCATIONS:

1. SR 1146, Edgecombe County-From US 301 to SR 1135. Length: 2.40 shoulder miles.
2. SR 1135, Edgecombe County-From SR 1146 to SR 1143. Length: 2.43 shoulder miles.
3. SR 1143, Edgecombe County-From SR 1135 to SR 1141. Length: 0.51 shoulder miles.
4. SR 1130, Edgecombe County-From SR 1003 to NC 43. Length: 1.33 shoulder miles.
5. SR 1141, Edgecombe County-From SR 1143 to NC 43. Length: 1.43 shoulder miles.
6. NC 43, Edgecombe County-From SR 1130 to SR 1131. Length: 0.87 shoulder miles.
7. SR 1003, Edgecombe County-From NC 43 to Wilson County Line. Length: 3.38 shoulder miles.
8. SR 1407, Wilson County-From SR 1003 to SR 1002. Length: 1.06 shoulder miles.
9. SR 1419, Wilson County-From US 301 to SR 1003. Length: 0.87 shoulder miles.
10. SR 1003, Wilson County-From Edgecombe County Line to US 301 Bypass. Length: 4.76 shoulder miles.

Location of Sampling Sites within Spill Site No. 8

A. SR 1146, .7 mile West of SR 1135

B. SR 1003, .3 mile West of SR 1408

C. SR 1003, .06 mile East of SR 1126

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	1400	1700	1000
1-3 Inches	20	100	13
3-6 Inches	1.8	14	16


SPILL SITE No. 8
ROCKY MOUNT
POP. 34,284
SAMPLE A
SAMPLE B
SAMPLE C
WILSON CO.
NASH CO.
ELM CITY
POP. 1,201
SARATOGA
POP. 391
MACCLESFIELD
POP. 536
Cobbs
Rosebud
Pleasant Hope Ch.
Bridgersville
Wilbanks
Penders Crossroads
St. Lewis
Pitt Crossroads
Liebs
Owens Chp.
Holdens Crossroads
Good News Ch.
Aspen Grove Ch.
Piney Grove Ch.
Drivers Store
Ocal Ch.
Bymums
Evansdale
Shackleford
Joyners Crossroads
West Mount
Langley Store
Kingsboro
Cherrys Chp.
Aenon
Old Town Creek
Wooten
Brown
Mercer
Swamp
Creek
Cattail
White
Otter
Little
Contentnea
Whitehawk
Hominy
Swamp
RIVER
COAST
SEABOARD
TO FARMVILLE
PITT C

SPILL SITE No. 9

LOCATIONS:

1. No site description listed by DOT.

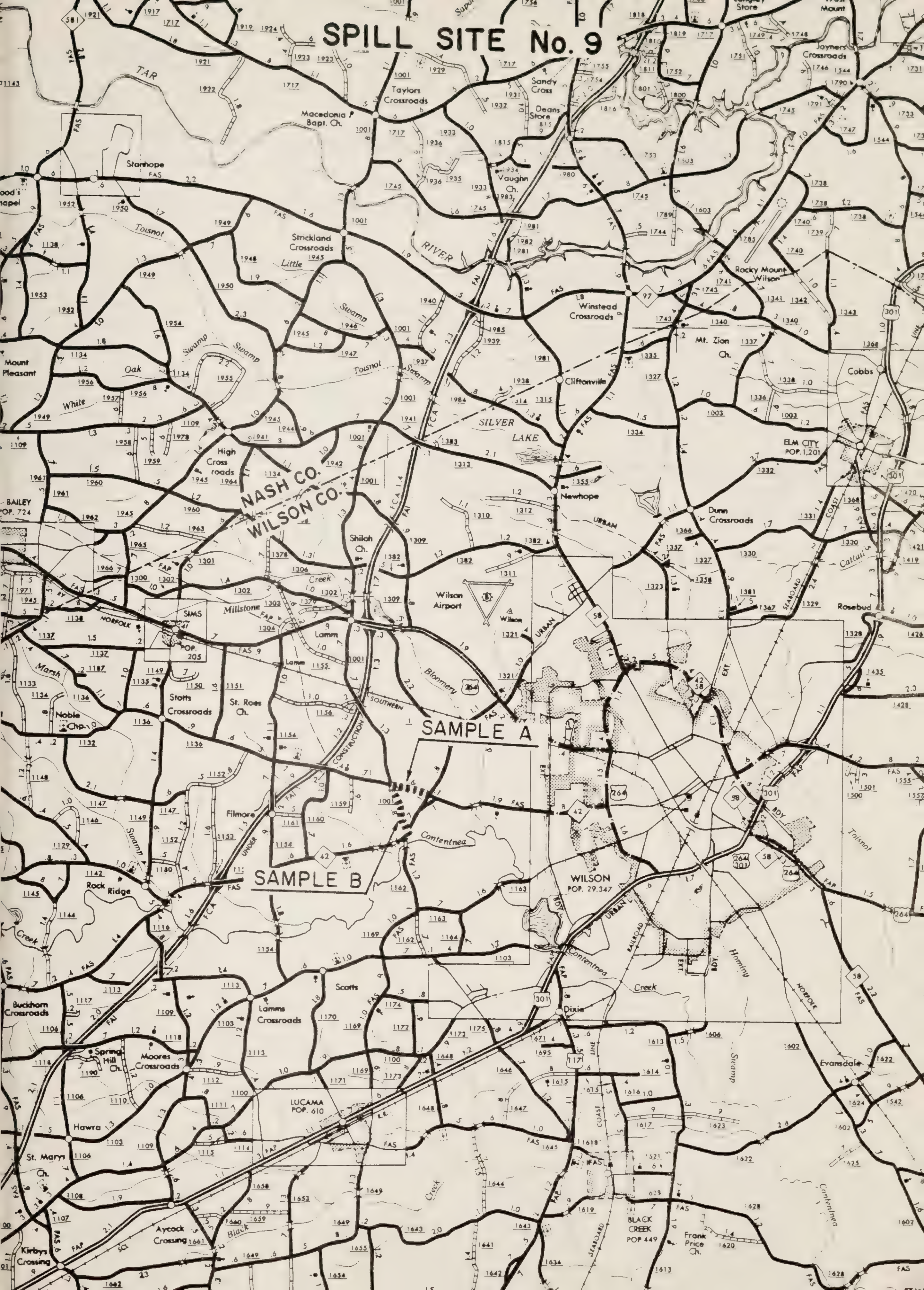
Location of Sampling Sites within Spill Site No. 9

A. SR 1101, 0.4 mile North of Hwy. 42-composite, East of SR 1001

B. SR 1001, 0.4 mile North of Hwy. 42-composite, West of SR 1001.

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B
Composite	< 1	< 1



SPILL SITE No. 9
SAMPLE A
SAMPLE B
NASH CO.
WILSON CO.
WILSON
POP. 29,347
Wilson Airport
ELM CITY
POP. 1,201
SIMS
POP. 205
LUCAMA
POP. 610
BLACK
CREEK
POP 449
BAILEY
Stanhope
Taylors Crossroads
Macedonia Bapt. Ch.
Sandy Cross
Deans Store
Vaughn Ch.
Strickland Crossroads
High Cross roads
Winstead Crossroads
Rocky Mount Wilson
Mt. Zion Ch.
Cliftonville
Newhope
Dunn Crossroads
Cobbs
Rosebud
Shiloh Ch.
Lamm
Stotts Crossroads
St. Roes Ch.
Noble Chp.
Filmore
Rock Ridge
Scotts
Lamms Crossroads
Buckhorn Crossroads
Spring Hill Ch.
Moores Crossroads
Hawra
St. Marys Ch.
Aycock Crossing
Kirbys Crossing
Dixie
Evansdale
Frank Price Ch.
Joyners Crossroads
Mount Pleasant
TAR
RIVER
Toisnot
Little
Swamp
SILVER
LAKE
White
Oak
Millstone
Creek
Marsh
Bloomery
Contentnea
Creek
Hominy
Black
Cattail

SPILL SITE No. 10

LOCATIONS:

1. NC 58, Nash County-From Nashville to Wilson County Line. Length: 4.12 shoulder miles.

2. Wilson County segment not described.

Location of Sampling Sites within Spill Site No. 10

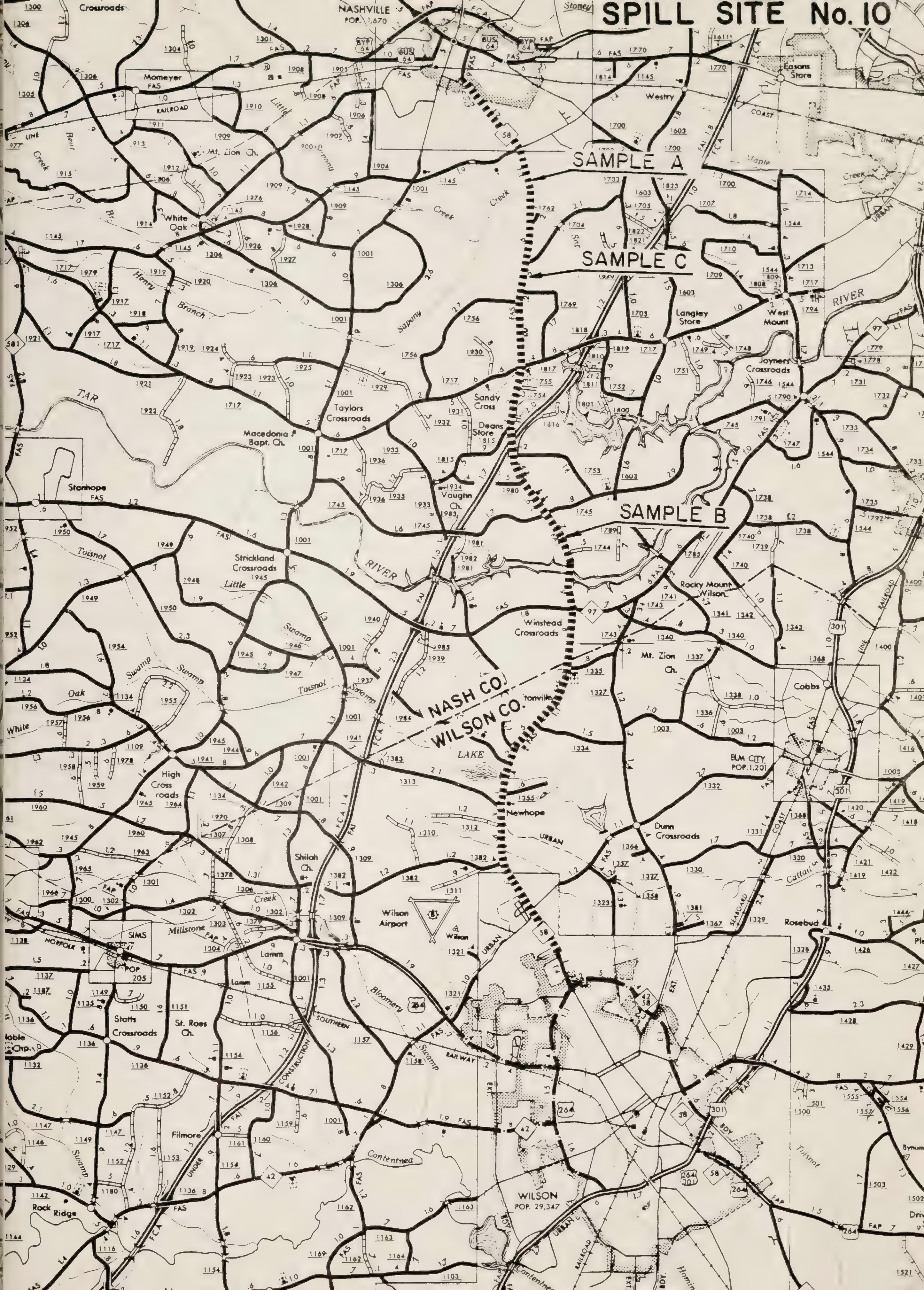
A. NC Hwy. 58, .55 mile South of SR 1145

B. NC Hwy. 58, 60' North of SR 1744

C. NC Hwy. 58, 216' South of SR 1756

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE A ~~SITE A~~	SAMPLE B ~~SITE B~~	SAMPLE C ~~SITE C~~
0-1 Inches	680	58	560
1-3 Inches	46	< 1	25
3-6 Inches	1.2	< 1	1.2


SPILL SITE No. 10
SAMPLE A
SAMPLE C
SAMPLE B
NASH CO.
WILSON CO.
NASHVILLE
POP. 1,670
Momeyer
Mt. Zion Ch.
White Oak
Westry
Easons Store
Langley Store
West Mount
Joyners Crossroads
Sandy Cross
Deans Store
Taylors Crossroads
Macedonia Bapt. Ch.
Stanhope
Vaughn Ch.
Strickland Crossroads
Rocky Mount-Wilson
Winstead Crossroads
Mt. Zion Ch.
Cobbs
ELM CITY
POP. 1,201
High Cross roads
Newhope
Dunn Crossroads
Shiloh Ch.
Wilson Airport
Rosebud
SIMS
POP. 205
Lamm
Stotts Crossroads
St. Roes Ch.
Filmore
Rock Ridge
WILSON
POP. 29,347
TAR
RIVER
Toisnot
Little
Swamp
Contentnea
Bloomery
Cattail
LAKE
Henry Branch
Sapony
Creek
COAST
LINE
RAILROAD
SOUTHERN
RAILWAY
SEABOARD
NORFOLK
URBAN
CONSTRUCTION

SPILL SITE No. 11

LOCATIONS:

1. NC 97, Wake County-From Zebulon to Franklin County Line and from US 64 Bus. to Zebulon. Length: 4.50 shoulder miles.

2. NC 97, Franklin County-From Wake County Line to Nash County Line. Length: 0.90 shoulder miles.

3. NC 98, Nash County-From Franklin County Line to NC 231. Length: 1.41 shoulder miles.

4. NC 231, Nash County-From NC 98 to SR 1137. Length: 0.94 shoulder miles.

5. SR 1137, Nash County-From NC 231 to NC 97. Length: 3.43 shoulder miles.

6. NC 97, Nash County-From SR 1137 to Franklin County Line. Length: 4.39 shoulder miles.

7. NC 98, Franklin County-From Nash County Line to Bunn and approximately 5 miles west of Bunn. Length: 4.79 shoulder miles.

Location of Sampling Sites within Spill Site No. 11

A. 0.3 mile East of SR 2370 (NC 97)

B. NC 97, 0.5 mile East of NC 231

C. NC 98, 0.5 mile Northeast of SR 1611

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	130	79	110
1-3 Inches	4.8	1.2	1.6
3-6 Inches	1.2	1.0	< 1


SPILL SITE No.11
SAMPLE A
SAMPLE B
SAMPLE C
FRANKLIN CO.
WAKE CO.
NASH CO.
JOHNSTON CO.
SPRING HOPE
ZEBULON POP. 1,839
WENDELL POP. 1,929
MIDDLESEX POP. 729
CLIFTON POND
PERRY'S POND
Rocky Cross
Union Hope Ch.
Pine Ridge
Sutton
Riley
Pearces
Pilot
Samaria
Stony Hill
St. Marys Ch.
Frazier Crossroads
BSA CAMP CHARLES
TAR RIVER
LITTLE RIVER

SPILL SITE No. 12

LOCATIONS:

1. NC 96, Wake County-From 98 to Franklin County Line, traces only. Length; 0.03 shoulder miles.

2. No description for Franklin County segment.

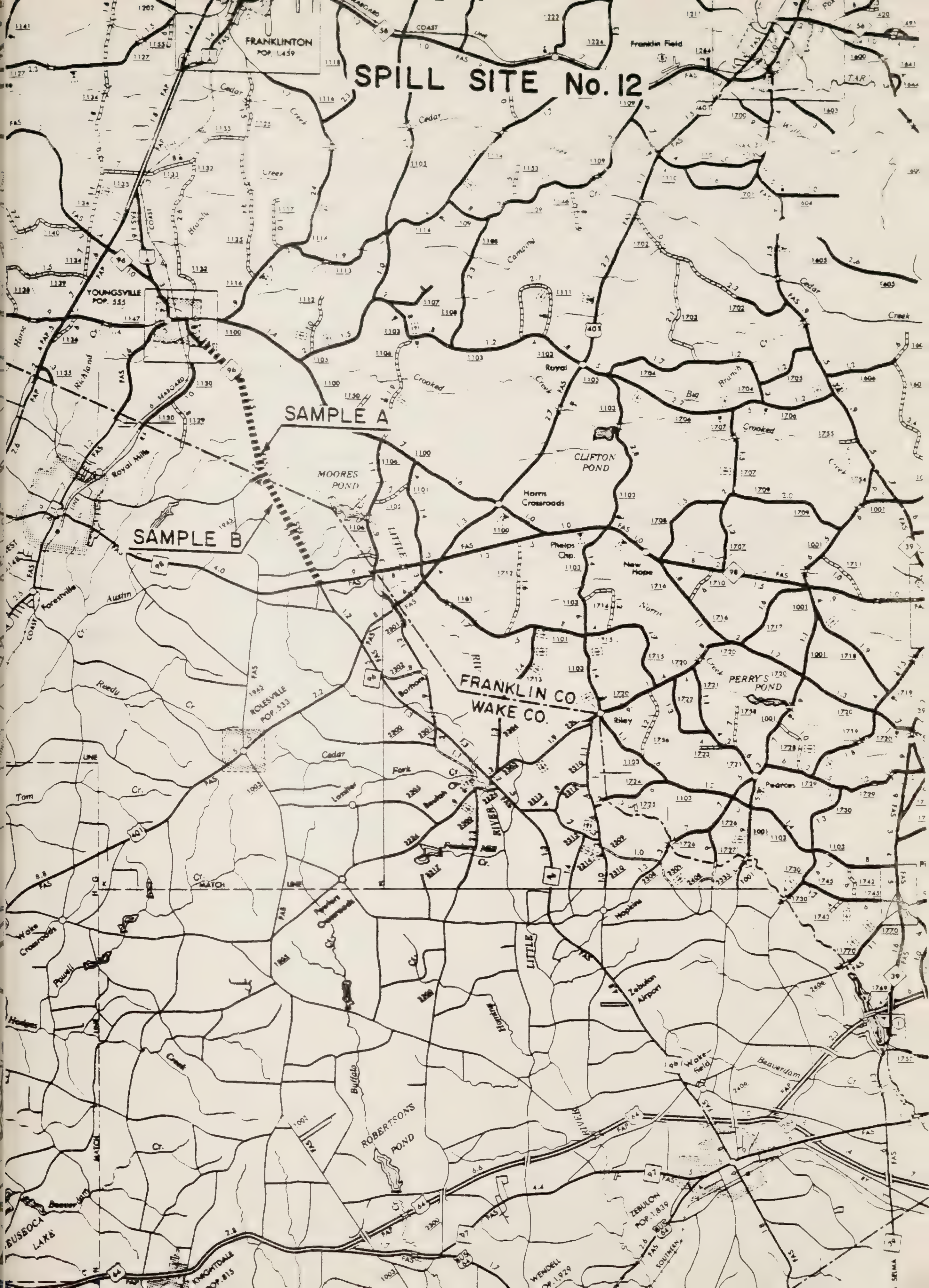
Location of Sampling Sites within Spill Site No. 12

A. Wake/Franklin County Line on NC North 96 (No PCB suspected at this point)-Composite

B. Wake/Franklin County Line on NC East 96 (No PCB suspected at this point)-Composite

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B
Composite	< 1	< 1


SPILL SITE No. 12
SAMPLE A
SAMPLE B
FRANKLIN CO
WAKE CO.
FRANKLINTON
POP. 1,459
YOUNGSVILLE
POP. 555
ROLESVILLE
POP. 533
ZEBULON
POP. 1,839
MOORES POND
CLIFTON POND
PERRY'S POND
ROBERTSONS POND
Royal Mills
Harris Crossroads
Phelps Chp.
New Hope
Riley
Pearces
Zebulon Airport
Wake Crossroads
Franklin Field

SPILL SITE No. 13

LOCATIONS:

1. NC 58, Nash County-From Franklin County Line to 3 miles North of Nashville.

2. NC 58, Franklin County-From Warren County Line to Nash County Line.

3. NC 58, Warren County-From intersection with NC 43 Southerly to Franklin County-both sides. Length: 19.25 shoulder miles.

Location of Sampling Sites within Spill Site No. 13

A. NC 58, 0.2 miles from SR 1631 and 1.2 miles from SR 1608

B. NC Hwy. 58, 2.0 mile South of SR 1649

C. Hwy. 58, 0.5 mile North of SR 1449

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	2500	< 1	2100
1-3 Inches	210		41
3-6 Inches	3.4		1.5

SPILL SITE No. 13 (Re-Sample)

LOCATIONS:

1. NC 58, Nash County-From Franklin County Line to 2 miles North of Nashville.

2. NC 58, Franklin County-From Warren County Line to Nash County Line.

3. NC 58, Warren County-From intersection with NC 43 Southerly to Franklin County-both sides. Length: 19.25 shoulder miles.

Location of Sampling Sites within Spill Site No. 13

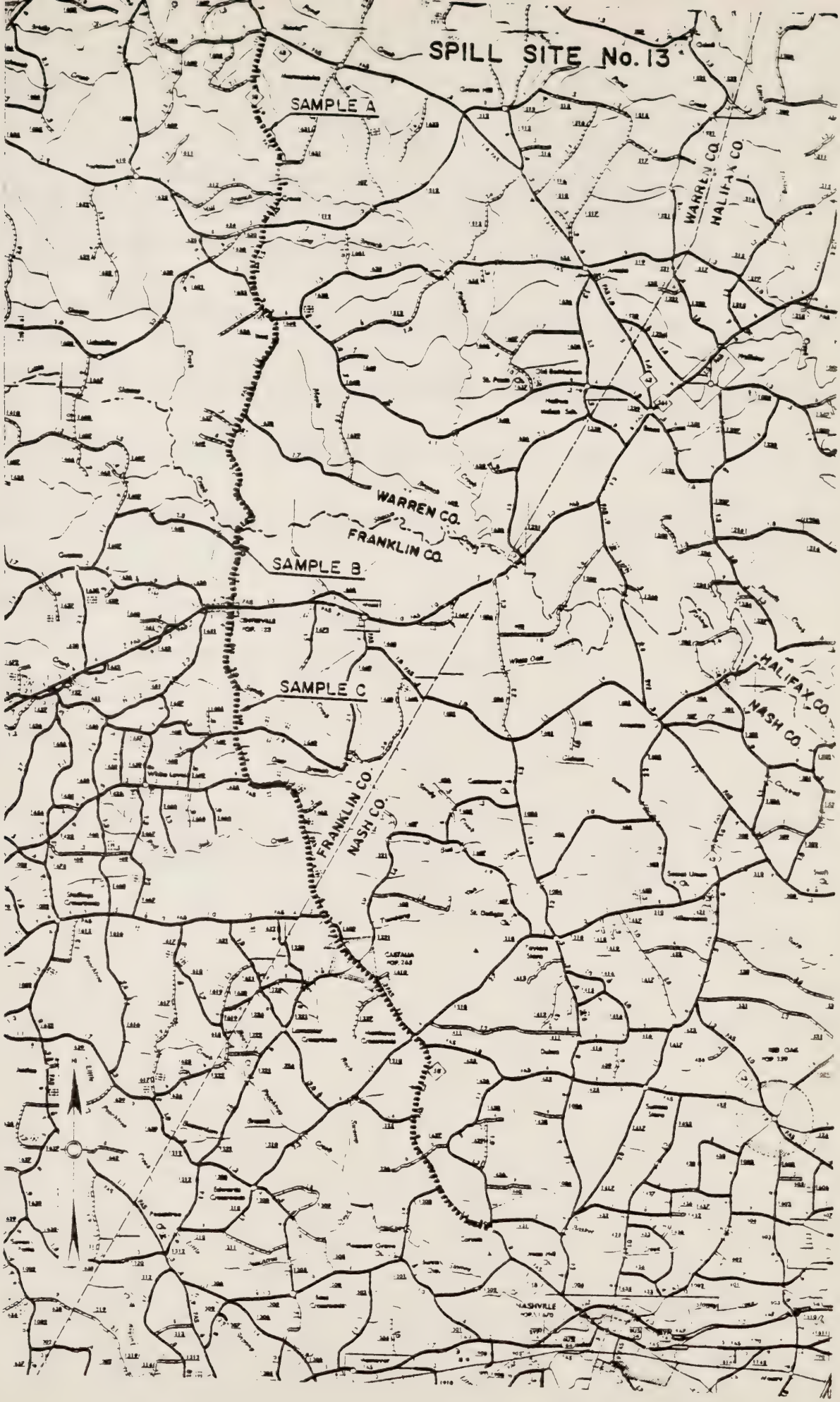
B. Hwy. 58, North of Centerville.

D. Hwy. 58, 200 yds. North of side 13-B taken 2/2/79 to be used for possible location.

E. Hwy. 58, 200 yds. North of sets #13-D auxillary samply if 13-B series return negative.

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE B ~~SITE B~~		
0-1 Inches	16 (1242) 160		
1-3 Inches	< 1 (1242) 1.9		
3-6 Inches	< 1 (1242) < 1		
	SAMPLE D ~~SITE D~~	SAMPLE E ~~SITE E~~	
Composite	86 (1242) 1100	170 (1242) 1600	


SPILL SITE No. 13
SAMPLE A
WARREN CO.
HALIFAX CO.
WARREN CO.
FRANKLIN CO.
SAMPLE B
SAMPLE C
HALIFAX CO.
NASH CO.
FRANKLIN CO.
NASH CO.
NASHVILLE

SPILL SITE No. 14

LOCATIONS:

1. SR 1432 and SR 1436, Franklin County-From 1/2 mile East of Moulton to a point beyond Gupton, then traces to Centerville. Length: 5.10 shoulder miles.

2. NC 561, Franklin County-From Nash County Line to Centerville. Length: 4.30 shoulder miles.

3. NC 561, Nash County-From Franklin County Line to Halifax County Line. Length: 0.7 shoulder miles.

4. NC 561, Halifax County-From SR 1317 to Nash County Line. Length: 3.58 shoulder miles.

5. NC 43, Halifax County-From Warren County Line to NC 561. Length: 0.65 shoulder miles.

6. NC 43, Warren County-From Liberia to Halifax County Line. Length: 6.40 shoulder miles.

Location of Sampling Sites within Spill Site No. 14

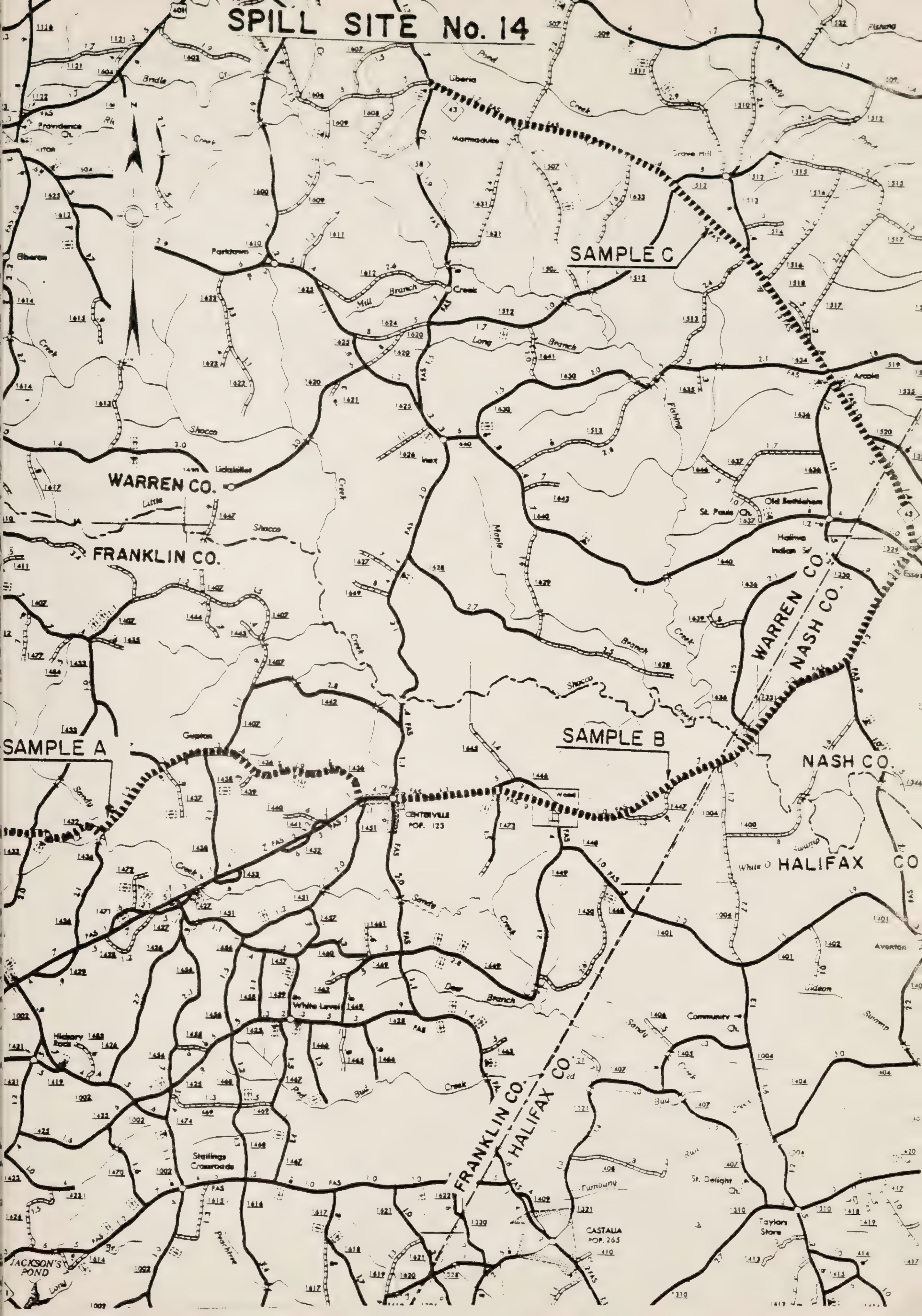
A. SR 1436 at 0.1 mile Northeast of Sandy Creek Bridge

B. Hwy. 561 and SR 1447

C. Hwy. 43, 0.9 mile Southeast of 1512

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B	~~SITE C~~ SAMPLE C
0-1 Inches	91	240	9.4 (1242) 42
1-3 Inches	< 1	< 1	< 1
3-6 Inches	< 1	< 1	< 1



SPILL SITE No. 14
SAMPLE A
SAMPLE B
SAMPLE C
WARREN CO.
FRANKLIN CO.
WARREN CO.
NASH CO.
NASH CO.
HALIFAX CO.
FRANKLIN CO.
HALIFAX CO.
Liberia
Marmaduke
Parktown
Creek
Inez
Lickskillet
Gupton
CENTERVILLE
POP. 123
White Level
Hickory Rock
Stallings Crossroads
JACKSON'S POND
CASTALIA
POP. 265
Arcola
Old Bethlehem
St. Pauls Ch.
Halifax Indian Sc.
Community Ch.
St. Delight Ch.
Taylors Store
Aventon
Grove Hill
Providence Ch.
Elberon
Shocco
Little Shocco
Mill Branch
Long Branch
Maple Branch
Fishing
Sandy Creek
Deer Branch
Red Bud Creek
Swamp
Gideon Swamp

SPILL SITE No. 15

LOCATIONS:

1. Description not listed.

Location of Sampling Sites within Spill Site No. 15

A. Hwy. 4 North of SR 1315

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE A ~~SITE A~~
0-1 Inches	120
1-3 Inches	1.6
3-6 Inches	< 1

SPILL SITE No. 15 (Formerly) 16

LOCATIONS:

1. NC 4, Halifax County - From SR 1314 to SR 1308.
   Length: 3.13 shoulder miles

Location of Sampling Sites within Spill Site No. 15 (Formerly) 16

A. Hwy. 4 at SR 1309

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE A ~~SITE A~~
0-1 Inches	45
1-3 Inches	< 1
3-6 Inches	< 1

SPILL SITE No. 15 (Formerly) 17

LOCATIONS:

1. SR 1308, Halifax County - From 0.1 mile North of SR 1309 to 1.2 miles North.
   Length: 1.13 shoulder miles.

Location of Sampling Sites within Spill Site No. 15 (Formerly) 17

A. West side SR 1308, 1.6 miles of junction of Hwy. 4 and SR 1308

B. East side SR 1308, 1.6 miles of junction of Hwy. 4 and SR 1308.

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	~~SITE A~~ SAMPLE A	~~SITE B~~ SAMPLE B
Composite	5:2	33

SPILL SITE No. 15 (Re-Sample) 17

LOCATIONS:

1. SR 1308, Halifax County - From 0.1 mile North of SR 1309 to 1.2 miles North. Length: 1.18 shoulder miles.

Location of Sampling Sites within Spill Site No. 15 (Formerly) 17

A. SR 1308 1/4 miles from SR 1309 North side

B. SR 1308 1/4 miles from SR 1309 South side

C. SR 1308 1.0 mile North of SR 1309 East side of road asphalt covering

D. SR 1308 1.0 mile North of SR 1309 West side of road 0-1"

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE A ~~SITE A~~	SAMPLE B ~~SITE B~~	SAMPLE C ~~SITE C~~	SAMPLE D ~~SITE D~~
0-1 Inches	16	7.0	1.4	2.6 (1242) 76
1-3 Inches	5.5	1	1	1 (1242) 1
3-6 Inches	3.8	1	1	1 (1242)

SPILL SITE No. 15 (Formerly) 18

LOCATIONS:

1. SR 1315, Halifax County - 0.2 mile from NC 4 to 0.1 mile East of bridge.
   Length: 1.03 shoulder miles.

Location of Sampling Sites within Spill Site No. 15 (Formerly) 18

A. West side SR 1315 .1 mile junction of Hwy. 4 and SR 1315 composite sample 0"-1"

B. East side SR 1315 .1 mile junction of Hwy. 4 and SR 1315.

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE A ~~SITE A~~	SAMPLE B ~~SITE B~~
Composite	200	6.6

SPILL SITE No. 15 (Re-Sample) 18

LOCATIONS:

1. SR 1315, Halifax County - 0.2 mile from NC 4 to 0.1 mile East of bridge. Length: 1.03 shoulder miles.

Location of Sampling Sites within Spill Site No. 15 (Formerly) 18

A. SR 1315 East side of road

B. SR 1315 West side of road

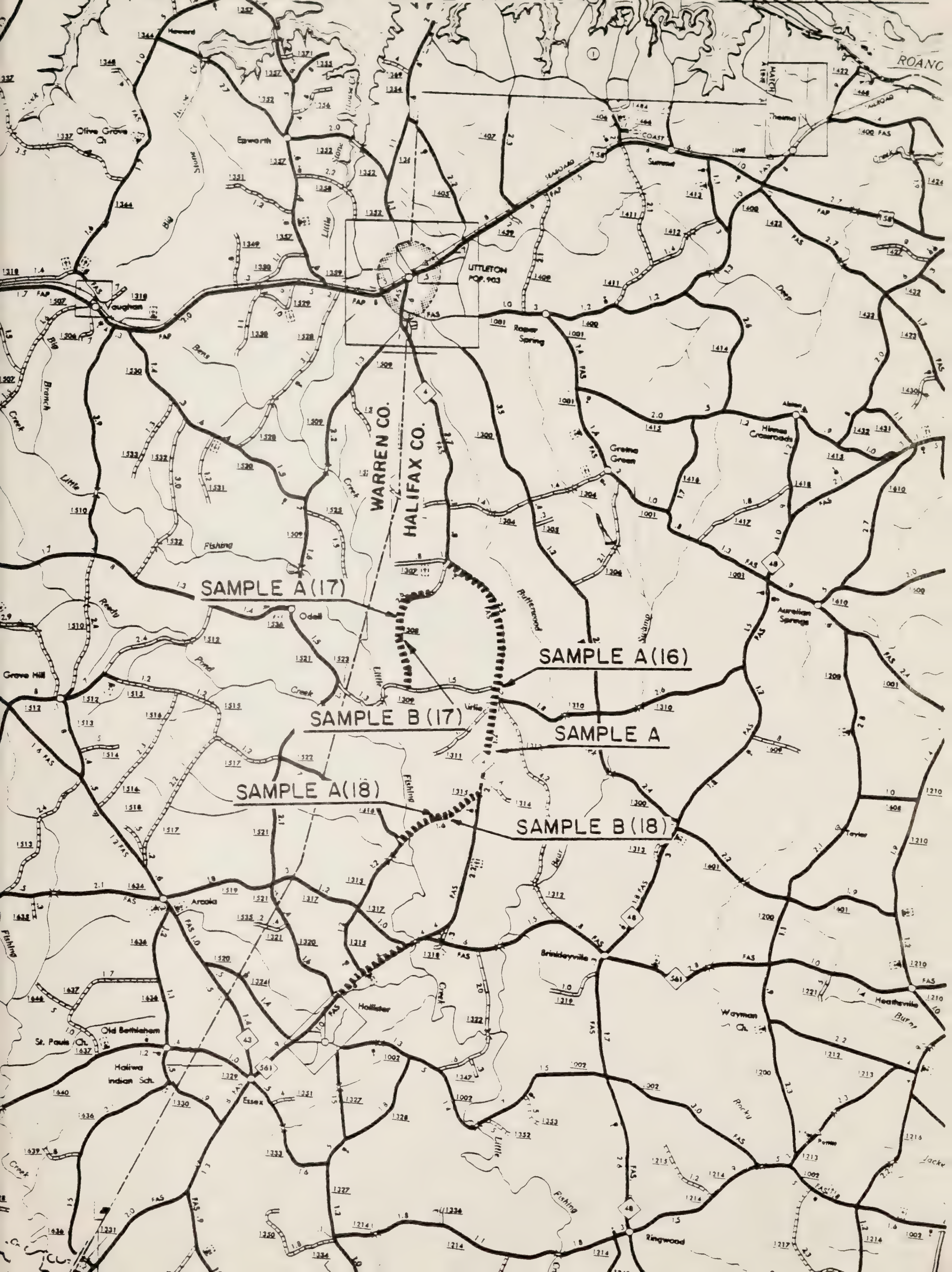
C. SR 1315, .3 mile East of bridge

D. SR 1315, .3 mile East of bridge

Sampling results are given in terms of mg/kg of Aroclor 1260 unless otherwise noted.

	SAMPLE A ~~SITE A~~	SAMPLE B ~~SITE B~~	SAMPLE C ~~SITE C~~	SAMPLE D ~~SITE D~~
0-1 Inches	13	18 (1242) 190	1.3	5.3
1-3 Inches	< 1	< 1 (1242) 4.4	< 1	< 1
3-6 Inches	< 1	1.1 (1242) 20	< 1	< 1

SPILL SITE No. 15



APPENDIX B

Laboratory Test Results
Soil Evaluation
Warren County, Pope Site

Soil sampling procedures to obtain soil materials for testing to determine suitability for construction of impermeable soil liners.

Sampling locations were in the immediate area of soil borings 1, 2, 7, 3, and 4 on the proposed Warren County disposal site.

Sampling instrument was a 3½-inch diameter, closed bucket, standard hand-operated soil auger.

The surface 0 to 5-inch layer of the soil was removed to prevent the inclusion of plant roots in the sampled soil materials.

An approximate total of 20 cores from all the different sampling locations were obtained. Cores were obtained from the soil layer 5 to 30 inches below the surface, composited and placed in a cloth sampling bag for transport to the testing laboratory. Cores from the soil layer 30 to 72 inches below the surface were composited and placed in a cloth bag. Fifty pounds of each of the two layers were obtained.

I, William L. Meyer, certify that the above procedures were utilized to obtain soil materials for laboratory analysis. The samples were obtained on December 13,1978 and delivered to Mr. O. W. Strickland on December 13, 1978.

I, O. W. Strickland, certify that the soil samples were received from W. L. Meyer on December 13, 1978, and transported to Soil and Material Engineers, Incorporated, under the direction of Mr. Jerry Perkins on December 14, 1978.

William L. Meyer
Environmental Engineer
Solid Waste & Vector Control Branch
Sanitary Engineering Section

O. W. Strickland, Supervisor
Solid Waste Management Unit
Solid Waste & Vector Control Branch
Sanitary Engineering Section

SOIL & MATERIAL ENGINEERS INC. ENGINEERING-TESTING-INSPECTION

3109 Spring Forest Road, Box 58069, Raleigh, N.C. 27658 Phone (919) 872-2660

January 4, 1979

Department of Human Resources
Division of Health Services
Solid Waste Management Unit
P.O. Box 2091
Raleigh, North Carolina 27602

Reference: Laboratory Tests
On-Site Borrow Soils
North Carolina

Gentlemen:

Enclosed are test results of samples provided to us by Mr. Jerry Perkins. Two test procedures were used. First, the soils were compacted to a specified compaction criteria and then permeability tests were performed on the compacted sample. The test procedures were performed in compliance with the following specifications:

1. Compaction - AASHTO*T-99, Method A

   *American Association of State Highway and Transportation Officials

2. Permeability - U.S. Army Engineer Manual EM 1110-2-1906 "Laboratory Soils Testing" Appendix VII

These test results represent true and accurate laboratory permeabilities to the best of our knowledge.

Very truly yours,

SOIL & MATERIAL ENGINEERS, INC.

Robert J. Owens

Robert J. Owens, P.E.

Subscribed and sworn before me this 4 day of January, 1979.

Notary

My Commission Expires:

August 17, 1981

6017 Dixon Dr., Raleigh, N.C.

TEST RESULTS

e No.	Maximum Density(pcf)	Test Density(pcf)	% Compaction	Permeability cm/se
	92.0	87.4	95	2.05×10^{-8}
	90.2	85.7	95	2.38×10^{-8}

Sample A Composite of 6" to 30" soil layer

Sample B Composite of 30" to 72" soil layer

SOIL & MATERIAL ENGINEERS INC. ENGINEERING-TESTING-INSPECTION

3109 Spring Forest Road, Box 58069, Raleigh, N.C. 27658 Phone (919) 872-2660

December 21, 1978

Department of Human Resources
Division of Health Services
Solid Waste Management Unit
P. O. Box 2091
Raleigh, North Carolina 27602

Attention: Mr. Jerry Perkins

Subject: Laboratory Tests
On-Site Borrow Soils
North Carolina

Gentlemen:

As authorized, Soil and Material Engineers, Inc. has performed laboratory tests on soil samples delivered by representatives of the North Carolina Department of Human Resources on December 20, 1978. These tests included moisture-density relationships (AASHTO T-99, Method A) and permeability tests. Test results are attached. Permeability tests were performed on remolded samples prepared at 95% compaction. Two (2) tests were performed on each sample for comparison. The comparisons are excellent. Sample A has a permeability of 2.05×10^{-8} cm/sec while Sample B is 2.38×10^{-8} cm/sec. The maximum dry density for Samples A and B are 92.0 pcf and 90.2 pcf, respectively.

If you have any questions, please contact us.

Very truly yours,

SOIL & MATERIAL ENGINEERS, INC.

Lawrence R. Matthews, P.E.
Manager Construction Services

LRM:mgm

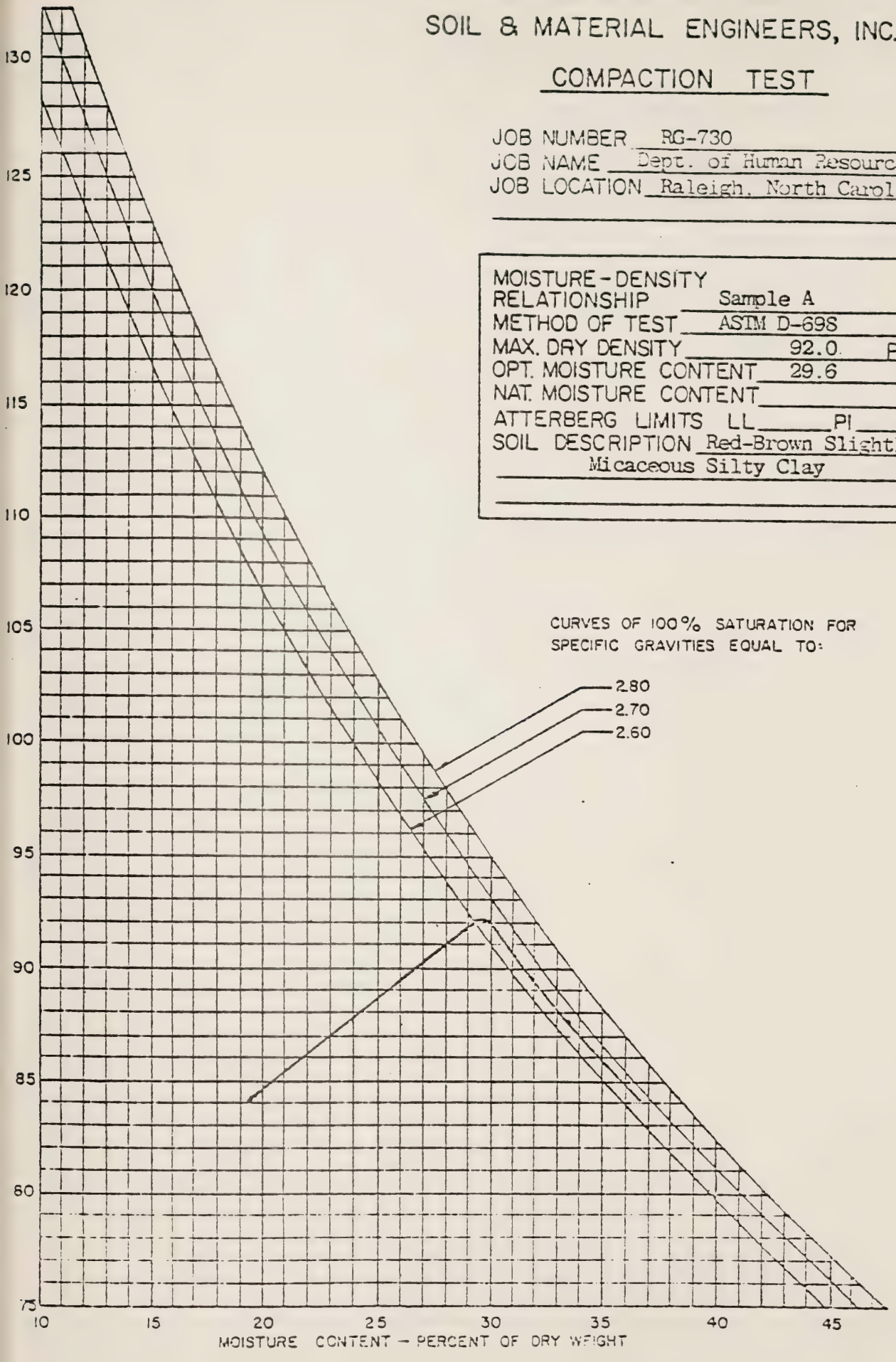
Attachments

SOIL & MATERIAL ENGINEERS, INC.

COMPACTION TEST

JOB NUMBER RG-730
JOB NAME Dept. of Human Resources
JOB LOCATION Raleigh, North Carolina

MOISTURE-DENSITY RELATIONSHIP	Sample A	
METHOD OF TEST	ASTM D-698	
MAX. DRY DENSITY	92.0	PCF
OPT. MOISTURE CONTENT	29.6	%
NAT. MOISTURE CONTENT		%
ATTERBERG LIMITS	LL ____	PI ____
SOIL DESCRIPTION	Red-Brown Slightly Micaceous Silty Clay	

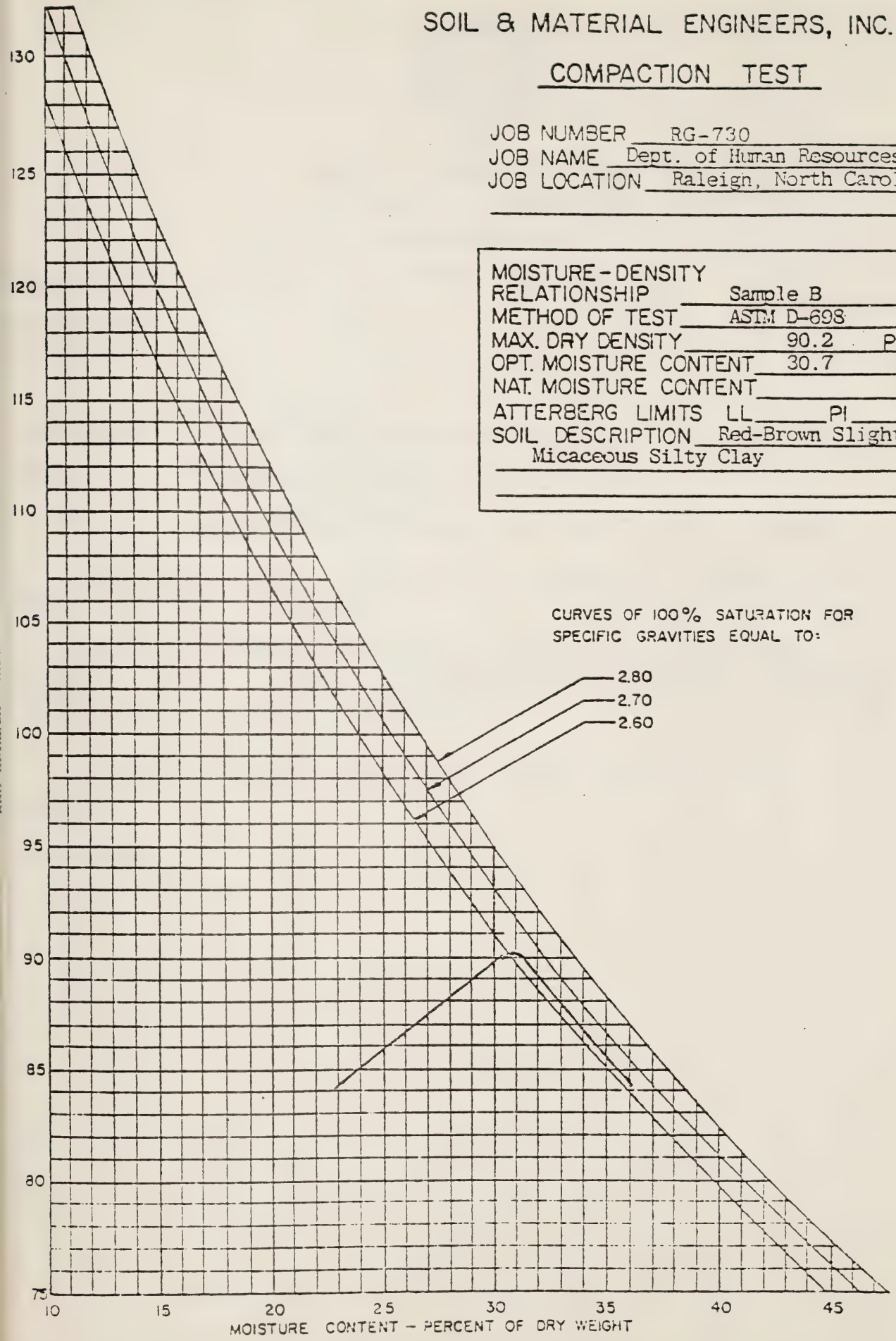


SOIL & MATERIAL ENGINEERS, INC.

COMPACTION TEST

JOB NUMBER RG-730
JOB NAME Dept. of Human Resources
JOB LOCATION Raleigh, North Carolina

MOISTURE-DENSITY RELATIONSHIP	Sample B	
METHOD OF TEST	ASTM D-698	
MAX. DRY DENSITY	90.2	PCF
OPT. MOISTURE CONTENT	30.7	%
NAT. MOISTURE CONTENT		%
ATTERBERG LIMITS	LL ____	PI ____
SOIL DESCRIPTION	Red-Brown Slightly Micaceous Silty Clay	



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH 27611

JAMES B. HUNT, JR.
GOVERNOR

THOMAS W. BRADSHAW, JR.
SECRETARY

September 20, 1978

DIVISION OF HIGHWAYS

MEMORANDUM TO: Mr. M.C. Adams, Maintenance Unit Head

FROM: W.D. Bingham, Head of Geotechnical Unit

SUBJECT: Investigation for Disposal Site for PCB (W.O. 4.5401101)

Attached are boring logs and sketch of a site we have investigated for PCB disposal in Warren County.

The site was drilled and sampled to a depth ranging from 28 feet to 41 feet. Twenty (20) samples were delivered to the Department of Transportation Laboratory to be tested for: Minus 200 material, Plastic Index, Liquid Limit and pH values.

If we can be of further help in this matter please let us know.

WDB:nah

Attachments

N. C. DEPARTMENT OF TRANSPORTATION
Division of Highways

G-5
1-78

PCB PIT BORING LOG

JECT 4.5401101 COUNTY Warren DATE 9-18-78

TE RES. ENGINEER PIT NO. PCB # 4

IP. USED 237-0001 6" Auger INVESTIGATED BY J.S. Britt

W/rock teeth

NUMBER	DEPTHS Feet FROM	TO	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	REMARKS: i.e. groundwater data moisture content, etc.
	0.0	11.0	1-A	Red-Brown Mica. -F-Sandy clay	Dry
	11.0	30.0	1-B	Brown Mica. Clayey silt	Moist @ 20.0'
	30.0	40.5	1-C	Brown Mica. Silty sand	
	40.5	41.2		Soft weathered rock- Practical auger	
				refusal @ 41.2'	
					Groundwater:
					0 Hr.-Dry caved in @ 28.5'
					24 hours-caved in @ 28.5'
	0.0	8.0	2-A	Red-brown mica. fine sandy clay	
	8.0	38.0	2-B	Brown highly mica. sandy clay silt	Wet @ 30'
					Groundwater:
					0-Hr.-Dry caved in @ 35.0
					24 Hr.- 34.2
	0.0	3.0	3-A	Red-brown mica. -F- sandy clay	Dry
	3.0	28.0	3-B	Brown mica. sandy clayey silt	Moist @ 19.0
					Groundwater:
					0 Hr. - Dry caved in @ 23.5'
					24 Hrs.- 22.9'
	0.0	10.0	4-A	Red-brown mica. -F- sandy clay	Dry
	10.0	33.0	4-B	Brown mica. clayey sandy silt	Wet @ 27.0'
					Groundwater:
					0 Hr.-Dry
					24 Hr.- Dry

N. C. DEPARTMENT OF TRANSPORTATION
Division of Highways

G-5
1-78

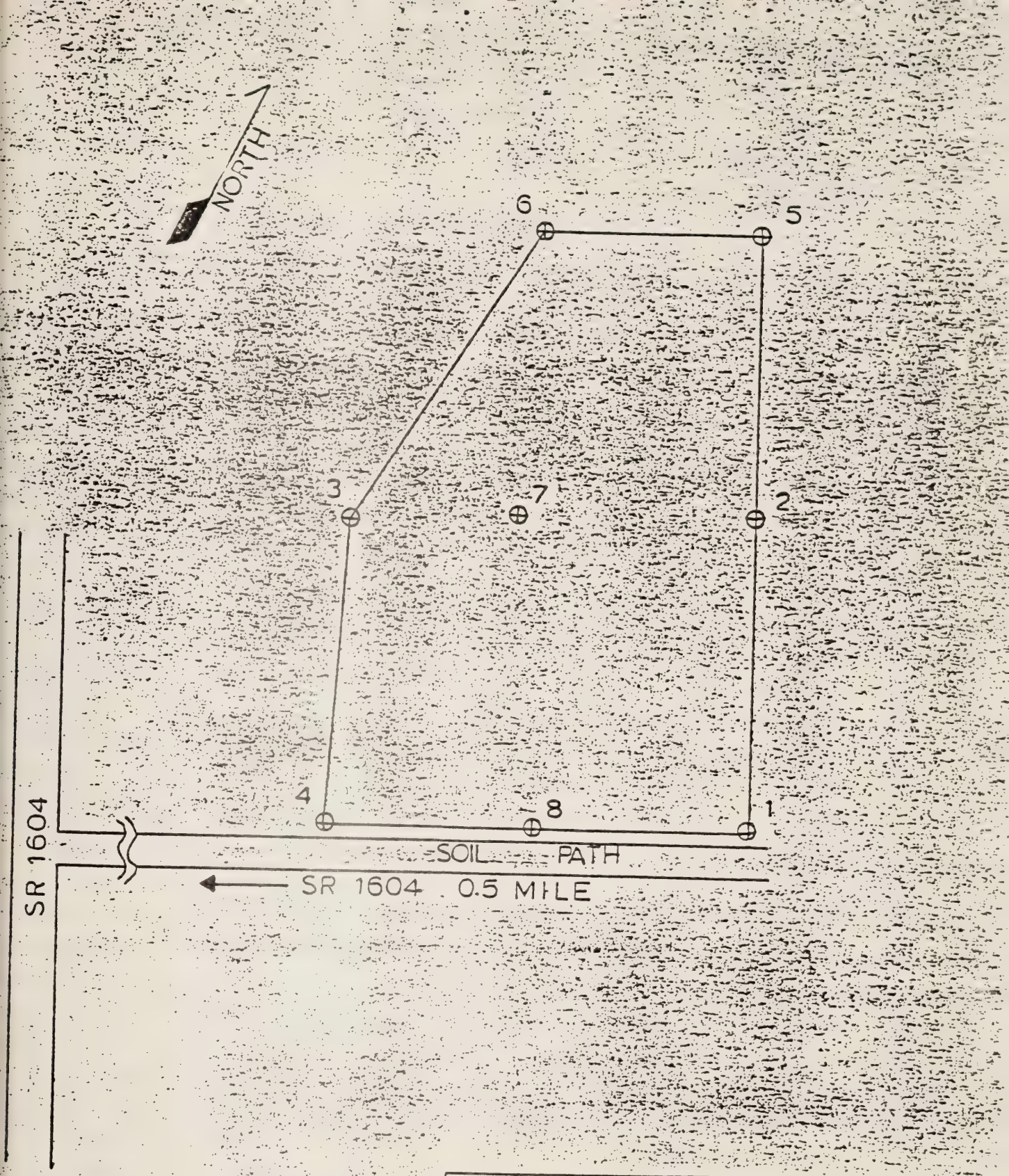
PCB PIT BORING LOG

JECT 4.5401101 COUNTY Warren DATE 9-18-78

TE RES. ENGINEER PIT NO. PCB # 4

P. USED 237-2001 6" Auger INVESTIGATED BY J.S. Britt
W/rock teeth

NUMBER	DEPTHS Feet FROM	TO	SAMPLE NUMBER	DESCRIPTION OF MATERIAL	REMARKS: i.e. groundwater data moisture content, etc.
	0.0	6.5	5-A	Red-brown mica. -F- sandy clay	Dry
				W/quartz lenses	
	6.5	25.0	5-B	Brown mica. sandy silt	Moist @ 25.0'
	25.0	33.0	5-C	Tan mica. silty -F-sand	Wet @ 29.0'
					Groundwater:
					0-Hr. -Dry caved in @ 30.0'
					24 Hrs.- Dry caved in @ 30.0'
	0.0	7.0	6-A	Red-brown mica -F- sandy clay W/	Dry
				quartz lenses.	
	7.0	12.0	6-B	Brown mica. sandy silt	Dry
	12.0	33.0	6-C	Tan mica. silty -F- sand	Wet @ 26.0'
					Groundwater:
					0 Hr. - Dry caved in @ 29.0'
					24 Hr. - dry caved in @ 29.0'
	0.0	10.0	7-A	Red-brown mica. -F- sandy clay	Dry
	10.0	20.0	7-B	Brown-tan -F- sandy clay	Moist @ 20.0'
	20.0	33.0	7-C	Brown -F- sandy silt	Wet @ 25.0'
					Groundwater:
					0 Hr.-dry caved in @ 26.7'
					24 Hrs. Dry caved in @ 26.7'
	0.0	9.0	8-A	Red-brown mica. fine sandy clay	Dry
	9.0	38.0	8-B	Brown mica. sandy silt	Moist @ 26.0'
					Wet @ 30.0'
					Groundwater:
					0 Hr. -dry caved in @ 33.2'
					24 Hrs. dry caved in @ 33'
				-F- - fine	



PCB PIT - SITE IV
PROJECT NO. 4.5401101
COUNTY WARREN
PROJ. GEOLOGIST J.S. BRITT
DATE 9-18-78

SCALE - 1" = 100'

PCB

M & T Form 803
11-1-73

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS & TESTS UNIT
SOILS LABORATORY

RECEIVED
SEP 25 1978
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

REPORT ON SAMPLES OF Soil for Quality & ph

t 4.5401101 County Warren Owner

Sampled 9-18-78 Received 9-19-78 Reported 9-22-78

ed from PCB Pit #4 By J. S. Britt

tted by W. D. Bingham

396732-396751 19 72 Standard Specifications

22-32

TEST RESULTS

Sample No.	1A	1B	1C	2A	2B	3A	3B	4A
Sample No.	396732	396733	396734	396735	396736	396737	396738	396739
ned #4 Sieve %	-	-	-	1	1	-	-	-
ng #10 Sieve %	100	100	100	98	98	100	100	100
ng #40 Sieve %	99	99	99	96	95	99	98	98
ng #200 Sieve %	74	54	48	74	63	78	70	77
Coarse Sand—2.0 to .25 mm. Ret. #60 %	4	9	7	7	11	3	7	4
Fine Sand—0.25 to .05 mm. Ret. #270 %	24	42	53	21	30	22	29	24
Silt—0.05 to 0.005 mm. %	22	33	24	24	33	29	42	24
Clay—Less than 0.005 mm. %	50	16	16	48	26	46	22	48
sing Sieve %	-	-	-	-	-	-	-	-
sing Sieve %	-	-	-	-	-	-	-	-
	64	48	36	64	47	58	53	58
	34	NP	9	36	19	24	14	29
O fication	A-7-5(20)	A-5(5)	A-4(3)	A-7-6(20)	A-7-6(10)	A-7-5(18)	A-7-5(11)	A-7-6(19)
re								
n								
No.	1	1	1	2	2	3	3	4
(ft.)	0	1.1	30	0	8'	0	3	0
to	11	30	40.5	8	38'	3	28'	10
ph	6.26	6.36	6.75	6.53	6.35	6.43	6.29	5.98

Mr. M. C. Adams
Mr. W. D. Bingham
Soils File

J. S. Britt

Soils Engineer

M & T Form 603
11-1-73

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS & TESTS UNIT
SOILS LABORATORY

REPORT ON SAMPLES OF Soil for Quality & ph

: 4.5401101 County ____ Owner ____

Sampled ____ Received ____ Reported ____

d from PCB Pit #4 By ____

ted by ____ 19____ Standard Specifications

396732-396751 TEST RESULTS 22-32

Sample No.	4B	5A	5B	5C	6A	6B	6C	7A
Lab. Sample No.	396740	396741	396742	396743	396744	396745	396746	396747
ed #4 Sieve %	-	12	-	1	7	2	-	-
g #10 Sieve %	99	84	99	96	90	97	100	100
g #40 Sieve %	97	80	96	93	86	92	97	99
g #200 Sieve %	64	62	64	48	65	59	50	87
arse Sand—2.0 to 25 mm. Ret. #10 %	7	9	9	7	8	10	11	2
ine Sand—0.25 to 05 mm. Ret. #70 %	36	20	33	51	23	35	47	14
Silt—0.05 to 0.005 mm. %	31	35	38	28	21	35	24	30
Clay—Less than 0.005 mm. %	26	36	20	14	48	20	18	54
ing Sieve %	-	-	-	-	-	-	-	-
ing Sieve %	-	-	-	-	-	-	-	-
	41	62	45	28	64	43	34	67
	9	27	14	4	29	5	6	31
ication	A-5(6)	A-7-5(14)	A-7-5(8)	A-4(3)	A-7-5(17)	A-5(5)	A-4(3)	A-7-5(20)
e								
o.	4	5	5	5	6	6	6	7
(ft.)	10	0	6.5	25	0	7	12	7A
to	33	6.5'	25'	33'	7	12'	33	
ph	5.89	6.05	5.91	6.31	5.73	5.78	5.89	5.72

Soils Engineer

M & T Form
11-1-73

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS & TESTS UNIT
SOILS LABORATORY

Ref.
Proj. ----------

REPORT ON SAMPLES OF Soil for Quality & ph

Project 4.5401101 County ---------- Owner ----------

Date: Sampled ---------- Received ---------- Reported ----------

Sampled from PCB Pit #4

Submitted by ---------- By ----------

396732-396751 19---- Standard Specification

22-3

TEST RESULTS

Proj. Sample No.		7B	7C	8A	8B				
Lab. Sample No.		396748	396749	396750	396751				
Retained #4 Sieve	%	-	-	-	-				
Passing #10 Sieve	%	99	99	100	100				
Passing #40 Sieve	%	97	97	99	97				
Passing #200 Sieve	%	67	55	80	58				
Coarse Sand—2.0 to 0.25 mm. Ret. #60	%	4	7	3	8				
Fine Sand—0.25 to 0.05 mm. Ret. #270	%	38	45	20	43				
Silt—0.05 to 0.005 mm.	%	38	30	23	31				
Clay—Less than 0.005 mm.	%	20	18	54	18				
Passing #10 Sieve	%	-	-	-	-				
Passing #200 Sieve	%	-	-	-	-				
L.		38	39	66	45				
P.		8	8	23	4				
SHO Classification		A-4(6)	A-4(4)	A-7-5(17)	A-5(5)				
Texture									
Color									
Hole No.		7	7	8	8				
Depth (ft.)		10	20	0	9				
to		20'	33'	9'	38'				
ph		5.77	6.03	5.66	5.90				

Soils Engineer

APPENDIX C

EPA Approval and Conditions
For the Warren County
PCB Disposal Site

United States
Environmental Protection
Agency

Region 4
345 Courtland Street NE
Atlanta GA 30308

Alabama, Georgia, Florida,
Mississippi, North Carolina
South Carolina, Tennessee
Kentucky

EPA

June 4, 1979

4AH-RM

Honorable James B. Hunt
Governor of North Carolina
State Capitol
Raleigh, North Carolina 27611

Dear Governor Hunt:

On February 17, 1978, the United States Environmental Protection Agency (EPA) published final regulations in the Federal Register (43 FR 7150-7164) on Polychlorinated Biphenyls (PCBs), Disposal and Marking. These regulations were amended by the Federal Register (43 FR 33918-33920) on August 2, 1978. These regulations prohibit the disposal of PCBs at any site not approved by the EPA after April 18, 1978, and these regulations require that the owner and/or operator of a chemical waste landfill used for the disposal of PCBs submit information in accordance with Section 761.41, Chemical Waste Landfills, to the Regional Administrator for review.

In accordance with the above referenced regulations, a formal application was filed with this office dated December 12, 1978, requesting approval of a site in Warren County, North Carolina which will be owned and operated by the State of North Carolina and used for the disposal of PCB contaminated soil from the highway shoulders in the State and from the Fort Bragg military reservation. A public hearing was held in Warrenton, North Carolina on January 4, 1979, for public input. The hearing record was held open until January 12, 1979, for additional written public input into the decision process.

The result of EPA's review is that the proposed site will meet all the technical requirements for a chemical waste landfill as required in Section 761.41(b), when constructed in accordance with the enclosed conditions to this approval except for the following:

(1) 761.41(b)(1)(vi) "Artificial liner thickness 30 mil. or greater."

(2) 761.41(b)(2) "The site shall be at least fifty feet from the nearest groundwater."

(3) 761.41(b)(5)(iii)(d) "Chlorinated Organics."

These three requirements are hereby waived for the proposed facility in the enclosed technical review. Your request to waive the leachate collection system underneath the liner is denied for the reasons stated in the enclosed technical review.

Accordingly, the Warren County, North Carolina site to be owned and operated by the State of North Carolina for the disposal of PCB contaminated highway shoulder soil is hereby approved subject to the enclosed conditions as a chemical waste landfill as authorized in 40 CFR, Part 761. It is understood by EPA and the State of North Carolina that this approval is based on the conceptual design only and that the final construction plans and specifications (if any) must be approved in writing by this office prior to the initiation of construction.

This approval is not to be construed to be approval for incineration, storage, marking or records and monitoring. We will continue to work with you in any way we can to expedite a public health oriented and environmentally sound solution to the PCB problem in North Carolina.

Sincerely yours,

John C. White

John C. White
Regional Administrator

Enclosures

cc: Herbert L. Hyde, Secretary
NC Dept. of Crime Control
& Public Safety

Marshall Staton, Chief
Sanitary Engineering Section
Division of Health Services
NC Dept. of Human Resources

Jerry Perkins, Head
Solid Waste & Vector Control
N.C. Dept. of Human Resources &
Division of Health Services

Approval Conditions for the PCB Disposal Site Owned And Operated by the State of North Carolina in Warren County, North Carolina on the Property Described in Governor Hunt's December 12, 1978, Application as Owned by Carter C. Pope and Linda W. Pope Found in Deed Book 278, Page 252.

A. General Requirements (all reports should be sent to the Regional Administrator, Attention: James H. Scarbrough):

1. Notify EPA at least two weeks in advance of the expected start of construction.

2. Notify EPA at least two weeks in advance of the initiation of disposal of PCB waste at the site.

3. Send EPA the data which is required by 43 FR 761.41(b)(5), monitoring systems for baseline and on the frequencies specified.

4. Maintain records as specified in 43 FR 761.45(b)(3) as appropriate and submit within 90 days after closure of the site to the Regional Administrator.

5. Advise EPA immediately of any changes, alterations or divergences in the operational and managerial policies and procedures as outlined in the documents submitted in support of the application.

6. Report to EPA any instance of detection of PCBs through the monitoring program immediately.

B. Technical Conditions of Approval:

1. The one foot of cover to be placed only on the middle 20 feet to 30 feet of the first lift of waste to preclude shunting any infiltration to the side walls.

2. A soils engineering firm shall be employed to provide quality control during the construction of the clay-silt liner.

3. Engineering expertise shall be provided by the State or a consulting firm on-site during all operations to provide and assure conformance with the final plans. Such assurance shall be furnished to the Regional Administrator at the completion of the project with a copy of "as built" plans.

4. A record shall be placed on the property deed which stipulates the particular boundary of the disposal area and waste contained therein with the associated waste elevations.

5. The State shall maintain an "all weather" access road indefinitely to permit access to the site and to facilitate collection of samples from monitoring wells.

6. Waste will be compacted as much as practicable with tracked equipment to prevent settlement after closure.

7. Appropriate erosion control measures shall be applied during excavation, filling and after closure to minimize erosion.

8. Trucks used for hauling the waste must be covered.

9. The final plans and specifications (if any) shall be submitted to the Regional Administrator (Attention: James H. Scarbrough) and written approval received prior to the initiation of construction.

10. A leachate collection system with a sump and access which will allow pumping out of any collected leachate is required above and below the clay liner.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: June 4, 1979

SUBJECT: Technical Review - Chemical Waste Landfill for PCB Submitted by the State of North Carolina

FROM: Chief, Residuals Management Branch

TO: John C. White
Regional Administrator

The State of North Carolina submitted an application for the approval of a disposal site in Warren County, North Carolina on December 12, 1978. The Technical review has been performed. The results of applying the criteria found in FR 761.41(b) to the application are as follows:

(b)(1) Soils - The site is not in a "thick, relatively impermeable formation such as large-area clay pans." Therefore, the soils are evaluat on the following criteria:

	Required	Proposed
(i) Soil liner thickness	3 ft. (compacted)	5 ft. (compacted)
(ii) Permeability (cm/sec)	$1X10^{-7}$ or (0.0000001)	$6.8X10^{-8}$ or (0.000000068)
(iii) Percent Soil Passing No. 200 Sieve	$\geq$ 30	75 Average
(iv) Liquid Limit	$\geq$ 30	51 Average
(v) Plasticity Index	$\geq$ 15	18 Average
(vi) Artificial Liner	30 mil.	None proposed[1/]

1/ A waiver was requested for this requirement. The primary justification for the waiver was that the State would instead place a 10 mil. plastic liner "umbrella" top on the landfill covered by two feet of soil which would be seeded with grass and sloped. This design would minimize any rainwater infiltration into the landfill. This waiver request should be approved.

(2) Hydrology - The site is located on the crest of a ridge at latitude 36° 20' 13", longitude 78° 09' 58" and is above the 100 year flood level. This is verified by the U.S. Geological Survey (see letter dated November 29, 1978, to Jerry C. Perkins). The bottom of the waste will not be 50 feet above the groundwater. The minimum distance will be held to 10 feet above the seasonal high groundwater table. The State requested a waiver for this criterion. In reviewing the justification of the waiver, I have concluded that the clay liner in the bottom of the trench plus the liner on top of the waste which will act as an umbrella for infiltration prevention, plus the leachate collection system and sump above and below the clay liner will sufficiently protect public health and the environment from "unreasonable risk of injury" as stipulated by paragraph 761.41(c)(4). Therefore, this waiver should be approved as requested.

(3) Flood Protection - The application states that the diversion structures will be designed to divert the 24 hour, 25 year runoff from the active portion of the landfill.

(4) Topography - The topography at the proposed site is low to moderate. The approval should be conditioned to require all practical erosion prevention measures to be used.

(5)(i) Monitoring Systems

a. The application states that baseline data will be collected prior to final approval. The approval should be so conditioned.

b. The application states that the surface streams and the groundwater will be sampled monthly during operation. The approval should be so conditioned by referring to paragraph 761.41(b)(5).

c. Bi-annual monitoring will be done after closure.

(ii) Groundwater Monitoring Wells

The application states that these will be constructed and located as required. EPA staff should verify the location of these in the field.

(iii) Water Analysis

The analysis for chlorinated hydrocarbons is requested to be waived. The regulations were written for commercial facilities which would be disposing of many different wastes. Since PCB is the only waste which will be disposed in this site, there is no point to monitoring for other chlorinated organics. This waiver should be approved.

(6) Leachate Collection

The proposed design does not show a leachate collection system under the liner as required by the regulation. Because of the groundwater proximity and the demonstrated public concern, I recommend that a leachate collection system and sump be installed under the soil liner to monitor the integrity of the soil liner. In addition, the leachate collection system above the soil liner should be required with the appropriate sump to provide the mechanism to allow pumping out of any leachate collected to prevent any significant hydraulic head buildup on the clay liner. Therefore, this waiver should not be approved.

(7) Operations

The operations plan submitted is satisfactory with the exception of the one foot of clean soil to be placed on top of first lift of waste. This clean soil is to be used to prevent the trucks from taking out contaminated soil on the wheels. This one foot should be restricted to the middle 20 to 30 feet of the trench so as not to provide a shunt to the side walls should any infiltration occur. This restriction will allow any infiltration to proceed down through the waste to the leachate collection system which would lead it to the sump for pumping out.

(8) Supporting Facilities - The supporting facilities are satisfactory as described. No mention was made of long-term maintenance of the access road. The approval should be conditioned to insure that all-weather access is maintained.

James H. Scarbrough

James H. Scarbrough

United States Department of the Interior

GEOLOGICAL SURVEY
P. O. Box 2857
Raleigh, NC 27602

November 29, 1978

Mr. Jerry C. Perkins, Head
Solid Waste and Vector Control Branch
Division of Health Services
N. C. Department of Human Resources
P. O. Box 27687
Raleigh, North Carolina 27611

Dear Mr. Perkins:

The proposed PCB disposal site located in Warren County at latitude 36°20'13", longitude 78°09'58", is above the 100-year flood level.

The site is located on a hilltop between Richneck Creek and one of its tributaries. I estimate, based on flood records collected at North Carolina streams, that the 100-year flood height is not more than 8 feet above average water level in these creeks. The proposed site is approximately 80 feet above these creeks and not subject to flooding.

Sincerely yours,

N. M. Jackson, Jr.
Hydrologist

NMJ:ceh

APPENDIX D

Comments Received on the Draft Environmental Statement

KERR-TAR REGIONAL COUNCIL OF GOVERNMENTS

P.O. Box 709 238 ORANGE STREET HENDERSON, N.C. 27536

PHONE (919) 492-3561

J.D. Everett, Executive Director

January 25, 1980

Ms. Chrys Baggett
N. C. Department of Administration
State Clearinghouse
Room 504, Administration Building
116 W. Jones Street
Raleigh, NC 27603

RE: Draft Environmental Impact Statement for the Removal and Disposal of Soils Contaminated with PCBs Along Highway Shoulders in Warren County

Dear Ms. Baggett:

The Kerr-Tar Areawide Clearinghouse Review Committee has completed its review of the above referenced draft EIS.

The A-95 Review Committee does not concur with the draft Environmental Impact Statement per the following statements:

1. Additional emphasis needs to be placed on the integrity of the plastic liner.

   A. There is no proposal to maintain the surface free of trees whose roots could penetrate the plastic top liner and create a connection to surface water. Annual mowing should be a minimum requirement.

   B. The plastic liners along the side walls of the proposed site offer the only barrier between the disposed PCB waste and the surrounding soil. What other measures does the State propose in order to mitigate any damage of or decomposition of the plastic liner. (root intrusion, damage by equipment, etc.)?

2. Half the waste is to be buried above current ground level and thus be subject to eventual erosion or slump. The Statement mentions flood diversion structures but does not describe them or indicate how long they might be expected to last.

3. The proximity of the water table and the bottom of the sump is too close. This is of utmost concern since the exact elevation of the water table has not been determined, only estimated.

   The EIS states that excavation will not come closer than seven feet from the water table (pp. 12, 17), but it is unclear as to whether this includes the new lower sump. It's also unclear as to

how the high water table elevation was predicted. It appears that the highest actual measurement taken from several Feb. 1, 1979 borings at the site (306') was added to one-half of the maximum normal groundwater fluctuation in Warren Co. (11') which gave a high water level of 312' (311½' rounded off). Evidently this figure (312') was then subtracted from the maximum surface elevation at the dumpsite (343') resulting in a 31' difference between the ground level and the high water level. Since the study was conducted "during the middle portion of maximum seasonal fluctuation", the water was presumed to have already risen half as far as it was predicted to go which resulted in adding half of the fluctuation. If this methodology or a similar one was utilized in determining the high water level, it wouldn't seem to be too reliable. In addition, the lowest point on the dump surface, not the highest point, should probably have been utilized in determining how much working room would be available in relation to the groundwater table. The exact calculation utilized in determining the high groundwater level should be clarified.

4. The plan allows numerous opportunities for human errors in construction: installing plastic liners and pipes, compacting the clay liner, driving trucks on top of buried pipes and close to plastic side liners, and close tolerance surface grading.

5. The site must not be subject to flooding or have a hydrologic connection with the groundwater according to p. 16 of the Draft EIS "Surface water discharge is to Richneck Creek . . . 40 miles separate the site discharge area and the closest raw water intake." If a disruption were to occur, the PCB material would easily run off into Richneck Creek, and subsequently to the raw water intake located 40 miles downstream. How will the State prevent this from ever occurring?

6. This is not an adequate environmental impact statement. More emphasis has been placed on the chronology of events which have occurred and little or no mention has been made concerning the possible effects which the proposed PCB landfill could have on the natural environment. Also, by not exploring all possible environmental effects, the means to mitigate or eliminate factors which could do harm to the environment have been omitted.

7. Humans should also be considered in ascertaining possible environmental effects posed by the PCB disposal activity. Will PCB disposal affect the economy of Warren County through adverse connotations?

8. Reputable sources have disputed the State findings on the availability of clayey material, further investigation should be made.

9. The express will of the local government concerning PCB disposal should be given more consideration by the State government.

10. Warren County hired a geologist, Dr. Charles L. Mulchi, who took his own soil samples at the site and reviewed the State's plan. The Environmental Impact Statement does not mention him or the questions he raised about clay type, depth of clay, and groundwater uncertainties. The addition of the 30 mil plastic liner may have been in part a response to his criticism about lack of groundwater protection from leachate. He recommended that the State's proposal be turned down and his paper, A Review of the Proposal to Use Soils in the Afton Community of Warren County, N. C. as a Disposal Site for Soils

Contaminated with PCB, still remains valid for the most part.

To stop PCB, you must keep it dry. This formation because of the type of clay and the low proportion of clay to other types of soil, especially at the lower levels, is not naturally waterproof. James Scarborough of the EPA admits (Appendix C) that it "is not in a 'thick, relatively impermeable formation such as large-area clay pans'". Liners must be formed from earth dug from the surface. Of eight samples taken from the top layers by the N. C. Dept. of Transportation, only three showed 50 percent or more clay (Appendix B). The percent went down as they went deeper. To quote Dr. Mulchi, (pp. 4-5 Mulchi), "There are very small amounts of clay present deep within the soils at the site which would serve to trap escaping materials in future years. The relatively high sand content in these lower regions suggest that moisture movement below the burial layer would be very rapid and that there could be a risk of groundwater contaminations resulting from leakage from the burial site."

"A dependence on such means as artificial plastic liners and barriers of soil less than 50 percent clay may not give the safeguards necessary for storage of large quantities of PCB material. Plastic liners may ultimately deteriorate due to actions of natural forces operating within the soil. This may result in moisture movement through the disposal site which in turn will move toxic materials. The low absorptive capacity of the kaolenite clay combined with the low moisture retention properties of the clays may not prevent the system from leakage of chemical waste at some future date."

Sincerely,

Roy M. Williford
Planning Director

RMW:sp

SIERRA CLUB ☙ Joseph LeConte Chapter

... To explore, enjoy and preserve the nation's forests, waters, wildlife and wilderness ...

15 February 1980

Burley Mitchell, Secretary
Department of Crime Control
& Public Safety
Raleigh, NC 27611

Subject: Removal and Disposal of Soils Contaminated With PCB's Along Highway Shoulders In North Carolina - Draft Environmental Impact Statement

Dear Secretary Mitchell:

Thank you for allowing us to submit our comments for your consideration even though it is past your deadline. As we stated in our January letter, we needed this extra time to compile our statement.

We previously commented on the Draft Negative Declaration in January 1979. Although many of the issues we raised have been addressed, many subjects remain that must be evaluated before the Sierra Club can assess the proposed action.

Sierra Club policy disapproves of landfilling of toxic or hazardous materials in most cases. In this case, we agree with the determination of the Administrator of the Environmental Protection Agency, Douglas Costle, in his letter of 4 June 1979 to Governor Hunt: "Any human exposure to PCB's is of concern because of what is known about this chemical." Disposal of the contaminated soil in a chemical waste landfill that complies with the following recommendations will provide an interim method for protecting public safety and health and for preserving our natural environment. We expect the state to remove the soil from the landfill and destroy the PCB's when an alternative technology is developed.

Recommendations required for the construction and operation and for the long term management of the proposed chemical waste landfill:

1. Citizens Monitoring Committee

A committee of local citizens must be formed to monitor the construction, operation and long term management of the facility. Members of the committee must include local officials, adjacent land owners, and leaders of the community including those who may be opposed to the proposed action. This will allow the affected community to keep close watch on all activities concerning this project. It must be in attendance during all activities, especially the monitoring after closure of the landfill.

2. Disclosure

All operations and monitoring data must be announced to the local and statewide news media on a regular and continuing basis. This will keep the public informed of the current status whether good or bad and will provide accountability of the responsible state officials.

3. Leachate Treatment

Treatment of leachate has been discussed in the DEIS. However, no method of disposal of the treatment residue of leachate after landfill closure has been discribed. An appoved EPA method of disposal must be provided for this residue.

The decontaminated effluent of the leachate must be tested before it is discharged. This effluent must not be released until laboratory analysis has confirmed that the PCB's have been removed. The DEIS must describe the manner in which the effluent will be discharged.

4. Restriction For Use Of Site

All possible legal and administrative actions must be taken to insure the one time use of this site for the disposal of the PCB contaminated soil as described in the DEIS. The affected community needs every guarrantee that the proposed action is the only use ever for the site.

The deed for the land must contain a covenant prohibiting the use of the entire parcel for any other storage, treatment or disposal facility for hazardous, radioactive , or toxic materials. Any lease for other activities such as farming must contain these restrictions.

The governor of the state must issue an executive order specifying the restrictions for this site. Additionally, the administration must seek special legislation from the 1980 session of the General Assembly to restrict the use of the site to the proposed action.

The state must include these restrictions in its permit application request to the Regional Administrator of the Environmental Protection Agency. The state must assure the citizens that all the loopholes for other uses of this site are eliminated.

5. Groundwater Separation

The proposed five (5) foot groundwater separation is insufficient. Information in the DEIS shows that a much greater separation is possible. Page 17, paragraph 1 gives the maximum excavation depth as 24 feet. Thus, by removing the thickness of the liner and leachate collection systems, the landfill will have a useable depth of 17 feet. Allowing for topographic variation, a useable depth of 15 feet would mean that the entire 40,000 cubic yards of contaminated material could be stored in an area of 1.7 acres.

By increasing the landfill surface area to 2.9 acres (as is shown in the N.C. Department of Transportation boring (soils) study in the DEIS), the maximum excavation depth would only be 14 feet - 10 feet shallower than proposed in the DEIS. This increase in area will increase the groundwater separation to 15 feet - more than double the proposed separation.

In the interest of maintaining environmental protection, the final design for the landfill must provide greater groundwater separation than proposed. This can be achieved at little or no increased cost and will provide a greater measure of security.

6. Landfill Sidewalls

According to Figure 5, Section I. D., the landfill will not have a contiguous clay liner; the design fails to provide a uniform container of equal specifications for the bottom, sides and top. The DEIS provides no information to show that latterally moving groundwater or that animals will not be a problem. In addition, there is no information about the long term integrity of the artificial liner.

The entire landfill must be encased in a clay liner that is contiguous from the cap to the bottom including the sidewalls. This contiguous liner must be constructed to the specifications that are proposed for the bottom in the DEIS.

7. Landfill Cap

The proposed cap design is insufficient to provide for vegetal erosion control and to prevent future penetration by surface water. The specifications on page 12 (10 mil artificial liner, 1.5 foot clay liner and 6 inches of topsoil graded to a 2% slope) fail to provide an adequate root zone for maintaining vegetation without an irrigation system. Any vegetation established in such a thin zone for roots will be very susceptable to drought. Site maintenance must include fertilization and reseeding of the vegetal cover.

Moreover, the cap is not thick enough to allow for pedogenetic (soil forming) processes. The design provides for an almost inpenetrable bottom; it must provide a no less penetrable cap. The chemical and physical forces that could penetrate the landfill are most intense at the ground surface. It is concievable that normal climatic events could easily penetrate the 2 feet of topsoil and clay liner within a century. This scenario is made more probable if a small area of vegetation dies and erosion occurs.

The cap design must specify 2 feet of root zone consistant with agronomic concepts and the same clay liner plus artificial liner requirements as proposed for the bottom in the DEIS. An agronomist-soil scientist must supervise all surficial earth disturbances, revegetation and cap construction.

8. Revised Draft Environmental Impact Statement

We request that a revised DEIS be prepared which incorporates our recommendations. This revised document will allow all agencies and the public to assess submitted comments on the proposed action.

Adoption of our recommendations will assist in providing greater protection of the public and the environment from the hazards of PCB contamination. Thank you for considering these comments.

Sincerely,

William H. Doucette, Jr.

William H. Doucette, Jr.
Hazardous Waste Committee

David W. Levy
Conservation Chairman
1428 Sedwick Rd.
Durham, NC 27713
(919)544-1187

APPENDIX E

USDA, Soil Conservation Service
Vegetative Cover Recommendations

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Post Office Box 27307, Raleigh, North Carolina 27611

June 4, 1980

Mr. O. W. Strickland, Head
Solid and Hazardous Waste
Management Branch
Environmental Health Section
Department of Human Resources
Post Office Box 2091
Raleigh, North Carolina 27602

Dear Mr. Strickland:

At your request, we have prepared, for inclusion in your final Environmental Impact Statement (EIS), recommended procedures for the establishment, support and maintenance of vegetative cover on the proposed PCB landfill disposal site in Warren County. We feel that the treatment suggested will be adequate for protecting the site from erosion.

We are pleased to be of service to you and the State of North Carolina in this matter. If you have any questions regarding the recommendations, please feel free to call me or James Canterberry, State Resource Conservationist at 755-4375.

Sincerely,

Harold L. Lile, acting

Jesse L. Hicks
State Conservationist

Attachment

cc: James Canterberry

ESTABLISHING AND MAINTAINING VEGETATION
WARREN COUNTY PCB LANDFILL

1. Apply a minimum of six inches of topsoil (12 inches is preferable) over the compacted clay layer.

   Topsoil - The material shall consist of natural surface soil; a loam, sandy loam, clay loam, silt loam, sandy clay loam, or other soil suitable for establishing vegetative cover. It shall not have a mixture of subsoil and contain no slag, cinders, stones, or soil lumps, sticks, roots, or other extraneous materials larger than one inch in diameter. Topsoil must be free of noxious weeds as defined by the N. C. Department of Agriculture.

   a. After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading topsoil, the subsurface or subgrade shall be loosened by disking or by scarifying to a depth of at least two (2) inches to permit bonding of the topsoil to the subsoil.

   b. The topsoil shall be uniformly distributed. Spreading shall be performed in such a manner that seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to establishing vegetative cover.

2. When soils are reasonably uniform, lime and fertilize according to soil test. In the absence of a soil test, apply two (2) tons of lime and 1,000 pounds of 5-10-10 or its equivalent per acre. Uniformly mix the lime and fertilizer into the top four (4) inches of the soil by ripping or tilling all areas to be seeded. All land preparation should be done across the slope. Complete land preparation by smoothing the seedbed with a tandem disk, spike-tooth harrow, or other equipment.

3. When a cyclone seeder is used, the area shall be cross seeded by applying one-half the seed in one direction and the other half at right angles to the first direction. When the seed are broadcast, a cultipacker shall be used over the entire area immediately following seeding.

4.

Plants and Mixture	Planting Rates/Acre	Optimum Planting Dates
a. Sericea Lespedeza (scarified) and Tall Fescue	50 lbs. 30 lbs.	February-April
b. Sericea Lespedeza (unscarified) and Tall Fescue	60 lbs. 30 lbs.	August-November

5. Mulching: Unweathered small grain straw or hay free from seeds of competing plants. Spread at the rate of two (2) tons per acre.

6. Maintenance fertilizer and lime

   a. Apply 500 lbs. of 5-10-10 per acre or equivalent in late winter or early spring or amount recommended by soil test.

      Apply in the fall if the Sericea is developing better than the fescue.

   b. Apply one (1) ton lime per acre each three or four years or amount recommended by soil test.